October 26, 1940

14983

THE LANCET

Offices: 7, Adam Street, Adelphi, W.C.2.

Telegrams: Lancet, Rand, London. Telephone: Temple Bar 7228 and 7229.

No. XVII. of Vol. II., 1940. LONDON, SATURDAY, OCTOBER 26, 1940. Pp. 72—Price 1s.
No. 6113. Vol. CCXXXIX. Founded 1823. Published Weekly. Registered as a Newspaper. Annual Subscription: Inland £2 2s. Abroad £2 10s.

OXFORD MEDICAL PUBLICATIONS

See Page 3

In Two Volumes. SELECTED WRITINGS OF
JOHN HUGHLINGS JACKSON, M.D., F.R.C.P., F.R.S.
I.—Epilepsy and Epileptiform Convulsions.
II.—Evolution and Dissolution of the Nervous System: Speech: Various Papers: Addresses and Lectures.
Edited by JAMES TAYLOR, M.D., F.R.C.P.
With the advice and assistance of GORDON HOLMES, M.D., F.R.C.P., and F. M. R. WALSHE, M.D., F.R.C.P.
Over 500 pages in each vol. Price 25s. net each; postage extra (inland 9d., abroad 10d.).
Hodder & Stoughton Ltd., 20, Warwick-square, E.C.4.

Recently Published. 4th Ed., fully revised, 954 pp., 930 Illus.
EMERGENCY SURGERY. 63s. net; postage 9d.
By HAMILTON BAILEY, F.R.C.S.(Eng.)
Bristol: John Wright & Sons Ltd. London: Simpkin Marshall Ltd.

PUBLISHED 10TH OCTOBER, 1940
LANCET WAR PRIMER
WOUND INFECTION
Edited by W. H. OGILVIE
96 pp. 2s. 6d. net Plus 3d. postage
The Lancet Ltd., 7, Adam-street, Adelphi, W.C.2

PROBLEMS OF
ANÆSTHESIA
IN GENERAL PRACTICE
By D. H. LUKIS, M.D., B.S.Lond.,
Late Hon. Anæsthetist, South London Hospital; late Clinical Assistant, Ear, Nose, and Throat Department, Queen's Hospital for Children; Hon. Medical Officer, Kingston Victoria Hospital.
Demy 8vo. 7s. 6d. net (postage extra). 158 + vi pages.
Hodder and Stoughton Ltd., 20, Warwick-square, E.C.4.

THE CLINICAL INTERPRETATION OF AIDS TO DIAGNOSIS.
Vols. I and II. Price 10s. 6d. each. Postage extra.
Volume I.—"Each of the 45 Sections included in the book is contributed by an experienced worker. . . ."
Volume II.—"We may say that the success of the first volume is here repeated. . . ."—British Medical Journal.
"Physicians and surgeons cannot afford to omit the knowledge here outlined. . . ."—Birmingham Medical Review.
The Lancet Limited, 7, Adam-street, Adelphi, London, W.C.2

PROGNOSIS. VOLS. ONE AND TWO
Price 10s. 6d. each net (postage 7d. each extra).
Companion Volumes to the "Modern Technique in Treatment" and "Clinical Interpretation of Aids to Diagnosis" Series.
The 124 articles of the series have been collected in book form in two volumes, which are fully indexed under titles, authors, and broadly classified into groups to facilitate quick reference.
The Lancet Limited, 7, Adam-street, Adelphi, London, W.C.2.

DISEASES OF THE THYROID GLAND.
With Special Reference to Thyrotoxicosis.
By CECIL A. JOLL, M.S., B.Sc., F.R.C.S. (Eng.).
Crown 4to. Fully illustrated. £3 3s. net.
"No praise is too high for the author of this great book. It must be considered as the standard work on thyroid disease. Its pages summarise all that is known of this most interesting subject at the present day."—West London Medical Journal.
William Heinemann (Medical Books) Ltd., 99, Great Russell-street, London, W.C.1.

RADIOTHERAPY IN THE DISEASES OF WOMEN.
By Malcolm Donaldson, B.A. (Cantab.), F.R.C.S. (Eng.), M.B., Ch.B. (Cantab.)
Physician Accoucheur with Charge of Out-patients, St. Bartholomew's Hospital; Consulting Gynæcologist, Royal Northern Hospital, &c.
Demy 8vo. 148 pages. 11 Illustrations in the Text; 2 Plates, one in Colour. Price 7s. 6d. net; postage 7d.
Hodder & Stoughton Ltd., 20, Warwick-square, E.C.4.

Free to the Medical Profession on request. Cloth bound Ed. 5s.
ARTIFICIAL LIMBS.
"SOLVITUR AMBULANDO."
A Symposium on Prosthetic Achievement.
Pp. 72. 37 Coloured Plates.
"I congratulate you on this interesting, instructive, and artistic production. I consider it to be a very great addition to my library."—M.B., Ch.B., F.R.C.S.
J. E. Hanger & Co., Ltd., 7, Roehampton House, Roehampton, S.W.15.

AN AYLESBURY BROADSIDE
Now Ready. From all Booksellers. Price 3d.
Setting out, from the medical standpoint, the grounds, social, economic and physiological, for the immediate grant of family allowances on a national scale.
The Lancet Limited, 7, Adam-street, Adelphi, London, W.C.2.

Pp. 328 + xii. 12s. 6d. net.
INTRODUCTION TO
DISEASES OF THE CHEST.
By JAMES MAXWELL, M.D. (Lond.), F.R.C.P. (Lond.).
Hodder & Stoughton Ltd., 20, Warwick-square, E.C.4.

ANATOMY IN THE LIVING MODEL.
By DAVID WATERSTON, M.A., M.D., F.R.C.S.E., F.R.S.E.,
Buist Professor of Anatomy at the University of St. Andrews.
270 pages, 74 Illustrations. 16 Coloured Plates. Price 15s. net; postage 9d.
". . . can be read and re-read by the student, general practitioner, the surgeon and physician."—St. Bartholomew's Hosp. Jour.
Hodder & Stoughton Ltd., 20, Warwick-square, E.C.4.

Second Edition. Pp. 190 + viii. 6s. net. Recently Published.
PRINCIPLES OF MEDICAL STATISTICS
By A. BRADFORD HILL, D.Sc., Ph.D.
The Lancet Limited, 7, Adam-street, Adelphi, London, W.C.2.

J. & A. C. ★ NEW BOOKS AND NEW EDITIONS ★ J. & A. C.

15s. THE EARLY TREATMENT OF NERVOUS AND MENTAL DISORDERS 15s.
By W. LINDESAY NEUSTATTER, B.Sc., M.B., B.S., M.R.C.P.
Physician in Charge of the Department of Psychological Medicine, Queen Mary's Hospital, London.

SURGICAL ANATOMY
By GRANT MASSIE, M.S., F.R.C.S.
New (Fourth) Edition. 158 Illustrations, many in Colour. 21s.

PHYSICAL TREATMENT:
By Movement, Manipulation and Massage
By JAMES MENNELL, M.D., B.C.
New (Fourth) Edition. 281 Illustrations. 25s.

FORENSIC MEDICINE:
A Textbook for Students and Practitioners
By SYDNEY SMITH, M.D., F.R.C.P.
New (Seventh) Edition. 179 Illustrations. 25s.

POISONS: Their Isolation and Identification
By FRANK BAMFORD, B.Sc. With a Foreword by Professor SYDNEY SMITH, M.D., F.R.C.P. 21 Illustrations. 18s.

★ J. & A. CHURCHILL LTD. ★

Felsol provides Safe Relief in BRONCHOSPASM and ASTHMA

FELSOL POWDERS ARE GIVEN ORALLY AND CONTAIN NO MORPHIA OR OTHER NARCOTIC

" . . . . The powders can be prescribed by the medical man in accordance with the definite régime which he decides to adopt in the treatment of a case, the claim for felsol being that its administration relieves promptly the attack of asthma by its influence over bronchial spasm. . . . "

Vide Notice in " The Lancet," 28·4·34, p. 929

Full particulars concerning formula and action together with clinical sample

Telephone: Clerkenwell 5862

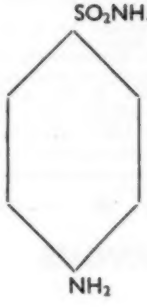
BRITISH FELSOL COMPANY LTD.
Wigton House, 206/212, St. John Street,
Clerkenwell - - - - - London, E.C.1

Telegrams: Felsol, Smith, London

A NEW CHEMOTHERAPEUTIC AGENT

'ALBUCID'

p-aminobenzenesulphonacetamide



For the peroral treatment of acute and chronic gonorrhœa and other infections of the urinary tract

- low toxicity
- rapid absorption and elimination
- short treatment

Literature gladly on request

Schering

SCHERING LIMITED
185/192, HIGH HOLBORN, LONDON, W.C.1

OCTOBER 26, 1940

THE LANCET

A JOURNAL OF BRITISH AND FOREIGN MEDICINE, SURGERY, OBSTETRICS, PHYSIOLOGY, CHEMISTRY, PHARMACOLOGY, PUBLIC HEALTH, AND NEWS

No. 6113 LONDON: SATURDAY, OCTOBER 26, 1940 CCXXXIX

CONTENTS

THE WHOLE OF THE LITERARY MATTER IN THE LANCET IS COPYRIGHT

ORIGINAL ARTICLES

Blood Substitutes in Treatment of Acute Hæmorrhage: An Experimental Evaluation: Standard Conditions—Control Experiments—Plasma and Serum—Clinical Application. By Major G. A. H. BUTTLE, M.R.C.S., Captain A. KEKWICK, M.R.C.P., and A. SCHWEITZER, M.D. (*with charts*) 507

Nutritive Value of White Flour with Vitamin B, added and of Wholemeal Flour: Experimental Details and Results. By HARRIETTE CHICK, D.Sc. (*with chart*) 511

Subacute Bacterial Endocarditis treated with Sulphapyridine and Heparin. By C. M. FLETCHER, M.B. 512

Late Effects of Subdural Hæmorrhage: Chronic Traumatic Subdural Hæmatoma—Cases with Mental Symptoms—Infected Hæmatoma—Hæmatoma with no known Trauma. By Prof. ERIC A. LINELL, M.D. (*illus.*) 514

A Case of Axillary Embolectomy. By JAMES F. HUGHES, M.R.C.P., and PHILIP BERRY, M.D. 516

Brucella Melitensis in Cow's Milk. By F. W. DUKE 517

Detection of Tuberculosis among Recruits. By G. GREGORY KAYNE, M.R.C.P. 518

LEADING ARTICLES

SUPERIORITY OF WHOLEMEAL 523

PHYSIOLOGY OF SLEEP ... 523

VENOUS LIGATURE AND PARTIAL ARTERIECTOMY 524

TREATMENT OF BACTERIAL ENDOCARDITIS 525

ANNOTATIONS

Knights Hospitallers 526

Spread of Paradoxical Metastases 526

Aspirin as a Gargle 526

Ætiology of Actinomycosis 527

Dentures and Indentures.. 527

Control of Malaria in Malaya 527

Cold Pressor Test in Pregnancy 528

Histological Effects of Thorotrast 528

More Hospital Grouping... 525

Doctors' Children sent Overseas 525

REVIEWS OF BOOKS

Field Surgery in Total War. By Major Douglas W. Jolly, M.B. 520

Diseases of the Esophagus: Diagnosis and Treatment. By Prof. Porter P. Vinson, M.D. 520

Diseases of the Nervous System. By F. M. R. Walshe, F.R.C.P. 520

Protozoology. By Richard Roksabro Kudo, D.Sc... 520

LETTERS TO THE EDITOR

Esprit de Corps (Dr. Stanley Alstead) 532

Dry Dressing (Mr. J. G. Bonnin, F.R.C.S.) 532

E.M.S. Salaries—and Other Things (Sir E. Graham-Little, F.R.C.P., M.P.) 532

Typhoid Abscess treated with Sulphapyridine (Major F. J. W. Porter) 532

Death and Dying (Sir Francis Fremantle, F.R.C.P., M.P., Dr. F. Harwood Stevenson) ... 533

PARLIAMENT

National Health Policy: Strain on the Health Services—Medical Lessons of War—Uses for Hospitals—Venereal Disease—Protection from Air Attack 529

Education Minister on National Physique—Money 530

Question Time: Rehabilitation—Tuberculosis in Scotland—Price of White and Brown Bread—Evacuation—Nurses at Rest Centres—Doctors' Attendance at First-aid Posts—Doctor Detained—Milk for Invalid Children 530

IN ENGLAND NOW

A Running Commentary by Peripatetic Correspondents..... 521

SPECIAL ARTICLES

Health Insurance in the United States: Reply to a British Resident by an American Medical Economist 522

OBITUARY

Sir Henry Head, F.R.C.P., F.R.S. (*with portrait*).... 534

Professor Bielschowsky ... 534

Sir Wilfred Grenfell, F.R.C.S. (*with portrait*).. 535

Dr. Robert Grieve..... 535

Major Wilfred Burnet Faris Orr 535

MEDICAL NEWS

University of Cambridge.. 536

Royal College of Surgeons of England..... 536

Royal College of Surgeons of Edinburgh 536

University of Glasgow 536

Service Casualties 536

Royal Air Force..... 536

Health in the Shelter..... 536

Royal Society of Medicine: Section of Odontology.. 536

Medical Society of London. 536

National Hospital, Queen Square 536

Ear Plugs 531

Categories of Interned Germans Eligible for Release 531

Middlesex Hospital..... 536

Cellona 536

Births, Marriages and Deaths 535

Appointments 535

New 3rd Edition **An Introduction to**

Gastro-Enterology

By WALTER C. ALVAREZ, M.D. (Mayo Clinic)

The author has completely rewritten and broadened the scope of his MECHANICS OF THE DIGESTIVE TRACT, adding seven chapters and many new illustrations. This classic work now provides the most authoritative and complete guide to diagnosis and treatment, embodying the modern physiologic approach, as seen by one of the world's most distinguished clinicians. Convenient summaries and an extensive bibliography are given.

800 pages • 186 illustrations • 42s net

New 4th Edition *Ready Nov. 4.*

The Art of Surgery

By H. S. SOUTTAR, D.M., M.Ch., F.R.C.S.

Hon. M.D. (Trinity College, Dublin); Hon. F.R.A.C.S.; Surgeon, London Hospital; Member of Court of Examiners, Royal College of Surgeons of England

This favourite textbook has been largely rewritten, entirely re-set and newly presented in two smaller, conveniently shaped, flexible volumes. Many of the characteristic line drawings are replaced and the method extended. The work now covers in succinct but ample detail all that is required for most examinations in surgery, and will prove invaluable for practitioners who wish to keep up to date.

780 pages (2 vols.) • 26 plates • 25s net

HEINEMANN (MEDICAL BOOKS) LTD 99 GREAT RUSSELL STREET LONDON WC1

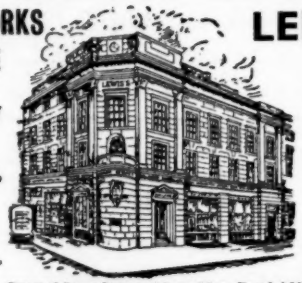
H. K. LEWIS & Co. Ltd., Publishers and Booksellers

TEXTBOOKS & STANDARD WORKS IN MEDICAL AND GENERAL SCIENCE

FOREIGN BOOKS obtained by licence from any country.

ANATOMICAL MODELS, CHARTS, OSTEOLOGY

MEDICAL STATIONERY
Card Index Systems, Filing Cabinets, Name Plates, etc.



Corner of Gower Street and Gower Place. Founded 1844

LENDING LIBRARY
MEDICAL & SCIENTIFIC
Annual Subscription from One Guinea
Special Terms to All Medical Students

SECOND-HAND BOOKS
at 140 Gower Street
Catalogues on application

Postal Address, All Departments:
136 GOWER ST., LONDON, W.C.1

SEVENTH EDITION

MODERN METHODS OF FEEDING IN INFANCY AND CHILDHOOD

By
DONALD PATERSON, M.D., F.R.C.P.
and
J. FOREST SMITH, F.R.C.P.

IX + 219 pages Demy 8vo **7/6 net**

First Published	....	1926
Second Edition	....	1929
Third Edition	....	1931
Fourth Edition	....	1934
Fifth Edition	....	1935
,, ,,	reprinted	1937
Sixth Edition	....	1938
Seventh Edition	....	1939

CONSTABLE & CO. LTD. 10 ORANGE STREET LONDON W.C.2

COLLABORATION

In their desire to offer their patients utmost security in contraception, doctors can regard us as their close collaborators. Our reputation as suppliers of birth control requisites dates back over 50 years and warrants complete confidence in all our products—a confidence which has been marked by the official recognition of the Family Planning Associations.

•

BURGE, WARREN & RIDGLEY, LTD.
91-92, Saffron Hill, London, E.C.1
Telephone: HOLborn 0050
Telegrams: "Drugsund, Smith, London"
ESTABLISHED 1850

"An After-Fitting Service to meet changing Aural Conditions"

OUR SERVICE TO DOCTORS AND THEIR DEAF PATIENTS!

IN prescribing "Ardente" for your deaf patients when an aid becomes necessary, you are safe because they can obtain service in most important towns throughout Great Britain—to meet any change in their aural condition. As an additional safety factor, each "Ardente" is covered by its maker's guarantee. There is a full range of "Ardente" types—**electrical** and **non-electrical Bone-Conduction, Granule, Valve** and **Phantom types**—which are individually suited, after Aurameter Test, to the needs of each case—no expense being incurred until hearing satisfactorily.

R. A. Dent
M. Inst. P.I.

Particulars gladly sent and Tests are made at Auristz, Doctors' patients, Hospital, or any of our addresses. Medical Press Reports are interesting. 10 Medals, 5 Diplomas. Supplied under National Health Insurance.

ARDENTE LTD.— **309 OXFORD STREET, LONDON, W.1**
(Between Oxford Circus and Bond St.) **'Phones: Mayfair 1380/1718/0947**
Birmingham Bristol Cardiff Exeter Edinburgh Glasgow Leeds Leicester Liverpool Manchester Newcastle Southampton

ORIGINAL ARTICLES

BLOOD SUBSTITUTES IN TREATMENT OF ACUTE HÆMORRHAGE

AN EXPERIMENTAL EVALUATION

BY

G. A. H. BUTTLE, M.R.C.S.
MAJOR, R.A.M.C.

A. KEKWICK, M.B. Camb., M.R.C.P.
CAPTAIN, R.A.M.C.

(*From the Army Blood-Supply Depot*)

AND

A. SCHWEITZER, M.D. Cologne, Ph.D. Lond.

(*From the Department of Physiology, Middlesex Hospital*)

IN uncomplicated cases of acute hæmorrhage early blood-transfusion effects complete recovery. In spite of this, such cases still die in civil practice because, during the time spent in obtaining and bleeding donors, irreversible tissue changes may take place and render treatment of no avail (Blalock 1934). At present, when there may be many casualties in a dozen different places at the same time, and when geographical relations between donors and recipients are disorganised, early treatment has become increasingly difficult. Storage of blood in banks has gone far to mitigate the delay, but until blood can be stored for longer than a few weeks blood banks are faced with the choice of being either wasteful or inadequate. There is need, therefore, for a blood substitute suitable for the treatment of the war wounded which can be stored for long periods, accumulated in large stocks, and be immediately available where casualties are likely to be received.

In this paper we consider the therapeutic value of various blood substitutes from the experimental standpoint and discuss the question of storage.

STANDARD CONDITIONS

The effects of various fluids in the treatment of acute hæmorrhage should be compared by observing the benefits produced by each under standard conditions. The experimenter has certain advantages denied to the clinician, for whom the collection of identical cases under standard conditions of bleeding and transfusion is impossible. Difficulties also beset the worker performing survival experiments, for though he can imitate clinical conditions fairly closely his results are based either on the crude test of percentage mortality or on uncertain observations. An experimental approach, therefore, employing a non-survival technique has been chosen as a preliminary to clinical assessment of the therapeutic value of blood substitutes.

Standardisation of experimental procedure demands a standard degree of hæmorrhage and standard conditions of transfusion. A standard degree of hæmorrhage should be one which produces a constant effect in all the animals used. It is insufficient to specify that a fixed proportion of the blood-volume should be removed, for the effects depend not only on the volume of blood lost but even more on the rate of loss. An animal may lose four-fifths of its blood-volume slowly and show no symptoms of hæmorrhagic shock, just as in man chronic hæmorrhage may produce no more than a slowly progressive anæmia. Loss of a fourth of the blood-volume very rapidly, on the other hand, may result in death. Again, removal of a fixed proportion of an animal's blood-volume at a fixed rate does not produce constant results because it makes no allowance for individual variations in reaction due to age and other factors. In order to allow for this, either the volume of blood removed or the rate of removal must be varied from animal to animal.

In this series cats were used. From experience gained with sixteen preliminary experiments it was decided to remove a fixed proportion (50%) of the calculated blood-volume at the fastest rate compatible with the animal being just alive at the end of the hæmorrhage. Each was finally reduced to a state where the blood-pressure was below 60 mm. Hg; little or no systolic-diastolic excursion was apparent and there was marked disturbance of respiration in the form of infrequent gasping breaths. This procedure ensures a degree of hæmorrhagic shock in which death is imminent and inevitable unless treatment is given.

In standardising the conditions of transfusion attention was given to the following points:

Time of starting reinjection.—Transfusion may be undertaken immediately after the cessation of bleeding or be delayed for some time in an effort to simulate clinical conditions. Delayed transfusion is unsatisfactory because the maintenance of blood-pressure at a level where tissue circulation is materially impaired produces irreversible changes (Blalock 1934); there comes a time when all treatment is of no avail. The exact moment at which this occurs and recovery becomes impossible cannot be judged in any individual animal, so that results obtained by comparing different treatment in a series of animals in which some have passed this point and others not may be confusing. Transfusion was therefore undertaken almost as soon as bleeding had ceased, so that the factor of irrecoverability was excluded from the results. There is no evidence to show that fluid which is ineffective when given immediately is effective when given at a later stage.

Volume of fluid injected.—If comparable results are desired the volume of fluid reinjected must bear a fixed relation to the volume of blood removed. If the same volume as was removed is replaced no allowance is made for the reserves of the animal which have been mobilised. The end-result may well be a blood-volume greater than normal. We arbitrarily decided to replace five-sixths of the volume removed.

Rate of reinjection.—The importance of standardising the rate of reinjection was seen during preliminary experiments, when different results were obtained with fluid injected rapidly and slowly. Too rapid transfusion—and it is easy enough for an operator with a 20 c.cm. syringe in his hand to give a transfusion too rapidly to a small animal—may produce cardiac embarrassment or other effects (Hirshfeld, Hyman and Wanger 1931). Too slow injection, on the other hand, prolongs the time during which the animal is subjected to a low blood-pressure. It was decided to inject all fluids at a rate of 2 c.cm. per kg. per minute. This means, in an average-size cat, a rate of 5 c.cm. per minute or a comparable rate in man of 120 c.cm. per minute—a not unreasonable rate after a severe hæmorrhage.

Anæsthesia was induced with a chloroform-ether mixture. Chloralose (70 mg. per kg.) dissolved in water was then slowly injected into the jugular vein. Blood-pressure was recorded from the carotid artery. Respiration was recorded by means of Wright's quantitative method (1934) or by means of a tambour. Animals were bled from a cannula in the femoral artery. Transfusions were made into the jugular vein.

Blood-pressure and respiration were recorded for a minimum period of 20 min. If both were stable throughout this period the experiment was begun. Blood was removed with a syringe from the femoral artery, watch being kept on the blood-pressure and respiratory tracings; 50% of the blood-volume, calculated as 6% of the body-weight (Erlanger 1921), was taken out in the fastest time compatible with the animal being just alive at the end of the removal (blood-pressure below 60 mm. Hg; marked respiratory disturbance.) Reinjection was started within 45 sec. and continued steadily at a rate of 2 c.cm. per kg. per min. until five-sixths of the volume of blood removed had been given. All reinjected fluids were sterile, and pyrogen-free solutions were used. The animals were left on a warm table for periods ranging from 90 min. to 6 hours. Blood-pressure and respiration were recorded every 15 min.

The return of the blood-pressure towards its initial level and the restoration of normal respiratory rate and rhythm are the signs by which the various transfusion solutions were judged.

CONTROL EXPERIMENTS

Control experiments of two types were made: in the first no treatment was given; in the second citrated whole blood was transfused into the animal.

AVERAGE FINDINGS IN CATS AFTER BLEEDING AND TRANSFUSION

Fluid replaced	No. of expts.	Av. wt. (kg.)	Av. initial B.P. (mm. Hg)	Av. vol. blood removed (c.cm.)	Av. time of bleeding (min. sec.)	Av. B.P. end of bleeding (mm. Hg)	Av. resp. disturbance	Av. vol. fluid given (c.cm.)	Av. time transfusion (min. sec.)	Av. B.P. end of transfusion (mm. Hg)	Av. resp. disturbance	Average B.P. (mm. Hg) 15 min. later	30 min. later	45 min. later	60 min. later	75 min. later	90 min. later	Comments
(*a*) None ..	7	2·24	143	69	10·39	46	+	None	..	..	..	46	36	35	..	..	..	No survivals after 1 hour.
(*b*) Whole blood	5	3·35	159	101	8·8	33	++	83	13·38	122	0	135	130	128	131	136	133	No deaths.
(*c*) 0·9% sod. chloride	5	3·72	156	112	9·50	24	++	95	14·28	91	+	81	67	56	43	38	25	No survivals after 1 hour 40 min.
(*d*) 5·4% glucose	5	3·41	140	102	14·58	29	++	88·8	14·57	96	+	69	58	51	45	43	41	No survivals after 1 hour 40 min.
(*e*) 6% gum-saline	8	3·56	164	107	14·2	33	+++	93	13·50	123	0	99	90	80	85	83	83	3 died. Unstable B.P. and periodic breathing in survivors.
(*f*) 25% hæmoglobin-Ringer	5	2·94	157	89·6	6·28	52	++	74·5	13·44	140	+	146	143	133	130	128	122	Immediate results better than with gum-saline. Respiratory disturbance; B.P. unstable.
(*g*) Cell-saline suspension	6	2·96	155	90·0	8·20	31	++	75	13·20	108	+	104	95	83	78	73	60	3 animals died. Unstable B.P. and periodic breathing in survivors.
(*h*) Plasma ..	7	2·79	132	82·4	11·20	30	+++	70·3	14·23	103	0	112	111	106	104	110	111	Rise of B.P. maintained. Respiratory disturbance abolished.
(*i*) Serum ..	7	2·78	149	84·4	10·25	34	++	71·8	14·5	114	+	112	93	89	88	82	87	Reactions at start of transfusion in 5 out of 7 animals; 3 severe.
(*j*) Serum (dog expts.)	3	6·4	157	195	3·50	70	++	162	13·30	138	+	120	113	101	97	91	83	Reaction in 2 out of 3 at start of transfusion.
(*k*) Dried serum	3	2·6	135	78	14·40	45	++	66	13·10	98	+	95	91	95	95	88	85	All had reaction at start of transfusion.
(*l*) Dried plasma (Davie)	6	3·2	134	97	9·40	56	++	24·5	4·40	..	..	..	..	..	..	..	..	All died after an average of 24·5 c.cm.
(*m*) Dried plasma (Greaves)	3	3·1	147	95	8·3	47	++	79·2	13·0	105	+	115	115	125	120	115	118	All had reactions at start of injection; respiration did not return to normal in 2.
(*n*) Filtered plasma	5	3·23	136	98	10·10	30	++	81·0	13·20	107	0	114	118	121	120	115	120	No reactions. Results equal to those of unfiltered plasma.
(*o*) Plasma-saline	3	2·7	125	83	7·33	28	++	69·4	13·15	103	0	88	73	67	61	60	52	Initial rise of blood-pressure not maintained.

Animals in control group 1 all died within a short time (table *a*). There was some difference in individual reaction but the lower the blood-pressure fell the quicker death followed. The respiratory disturbance, blood-pressure and time of bleeding are recorded and can be compared with the average figures for the remainder of the series. It will be seen that a comparable degree of hæmorrhagic shock was produced throughout.

Animals in control group 2 were transfused with fresh whole blood from another cat (9 parts blood to 1 part 3% sodium citrate solution). Recovery after transfusion was almost complete (table *b*), both as regards the height of the blood-pressure and the restoration of normal respiratory rate and rhythm. These signs of recovery were sustained throughout the entire period of observation.

RESULTS

Crystalloid solutions.—The use of isotonic saline in the treatment of hæmorrhagic shock has many adherents in the clinical field. Its chief virtue is that it is easily and cheaply prepared. Table *c* shows the effects produced by the solution: after a period of recovery all the animals died.

Much has been written of the dangers of administering too much sodium chloride (Coller and Maddock 1936) and as a result glucose solutions have been increasingly used. Treatment with isotonic glucose (table *d*) gives almost identical results to those obtained with saline. Our results confirm the observations of other workers who found that crystalloid solutions pass easily from the circulation into the tissue spaces and are unable to raise the blood-volume for more than a brief time (Miller and Poindexter 1932; Roberts and Crendall 1933). Claims have been made that hypertonic solutions produce a greater effect but even they have been shown to leave the circulation relatively rapidly (Kinsman, Spurling and Jelsma 1928).

Gum-saline.—This was first popularised by Bayliss (1918) and the last war gave many opportunities for its use. Its value depends on the fact that a 6% solution has an osmotic pressure and viscosity approximating to that of whole blood. These factors have more recently been shown to be very variable and capable of being altered by the pH, the salts in solution, and even from sample to sample (Amberson 1937). The average results obtained with three different samples of gum-saline solution are shown in table *e*. Immediate recovery in all the animals was good, but there was a tendency for the blood-pressure to fall after the transfusion ended and 3 out of 8 animals died. The fall of blood-pressure may in part be explained by the fact that gum leaves the circulation relatively easily (Amberson 1937) but is more probably due to the specific action of the gum on the vessels, causing dilatation and increased capillary permeability (Drinker 1927). The effects of gum-saline were much better than those of saline or glucose, but were not as good as those of whole blood. The respiratory disturbance and unstable blood-pressure seen in some animals may have been due to the fact that gum coats the red cells and reduces their oxygen-carrying power (Christie, Phatak and Olney 1935). Recently Studdiford (1937) has published a condemnation of the solution from the clinical and experimental point of view.

Hæmoglobin-Ringer solution.—This solution, now used mainly for physiological experiments, is stated by Amberson (1937) to have the following advantages as a blood substitute: it exerts a high colloidal osmotic pressure; and the dissolved hæmoglobin takes up oxygen and stimulates hæmopoiesis. The solution used contained 3·7 g. of ox hæmoglobin per 100 c.cm. (known as "25% hæmoglobin-Ringer"). The immediate recovery of the blood-pressure was good, but there was a tendency for it to fall during the period of observation and to be highly unstable (table *f*). Some degree of respiratory disturbance persisted and even increased in all the experiments save one. We have concluded that the immediate results obtained are uncertain and not as good as those of whole blood. They are better than those obtained with gum-saline. The main disadvantage

in the use of the solution, not illustrated by these experiments, is that the hæmoglobin leaves the circulation by way of the kidney within 48–72 hours (Amberson 1937) and during its passage down the renal tubules may produce renal obstruction (Baker and Dodds 1925). Aubertin and his colleagues (1939) describe renal and pulmonary lesions after the administration of hæmoglobin-Ringer solution to dogs, associated with a high mortality after some days.

Red cells in suspension.—One of the main advantages claimed for hæmoglobin-Ringer solution is that it is capable of carrying oxygen. In order to determine the importance of this factor in the treatment of hæmorrhagic shock it was decided to transfuse red cells suspended in isotonic crystalloid solutions. Blood was removed from a cat, centrifuged, the cells washed, and supernatant plasma replaced, volume for volume, by the crystalloid solutions. The suspension was then transfused into another cat. The immediate recovery after transfusion was good (table *g*) but the blood-pressure tended to fall and respiration was much disturbed in all experiments ; 3 of the 6 animals died. The crystalloid solution probably left the circulation, and possibly the added red cells so increased the viscosity of the blood that its flow through vital centres was reduced. Rossius (1925) reports that red cells exert about the same resuscitating power as saline in the treatment of acute hæmorrhage.

Plasma.—It appears, then, that in hæmorrhage of this degree replacement of red cells plays no vital part in treatment. Even at the end of bleeding the animals still have approximately 50% of their original hæmoglobin, an amount sufficient to maintain life. Crystalloid solutions give a temporary recovery until the fluid leaves the circulation ; thus, if the blood-volume is restored by the administration of fluid in a form in which it is held in the circulation permanent benefit should result. Both gum-saline and hæmoglobin-Ringer do this by virtue of the fact that they exert a colloid osmotic pressure equal to that of whole blood ; both have the disadvantage that they produce toxic effects in the recipient. A suitable blood substitute would be a solution exerting such a colloid osmotic pressure and not producing toxic effects, as Rous and Wilson (1918), Amberson (1937) and others have already concluded.

Theoretically, plasma or serum should be the ideal solutions. Table *h* shows the effects of transfusing plasma (obtained from citrated blood : 9 parts of blood to 1 part of 3% sodium citrate solution). The rise of blood-pressure and abolition of respiratory disturbance closely resemble the effects obtained with whole blood. Two of these experiments were continued for over 3 hours and one for almost 6 hours, without there being any fall of blood-pressure. It is safe to state that, with hæmorrhage of this degree, replacement with plasma gives as satisfactory a result as replacement with whole blood. On the other hand, it must be remembered that as the volume of hæmorrhage increases the loss of red cells becomes more important and plasma transfusions of less value. These findings accord with those of Mahoney (1938) and Peyton Rous and Wilson (1918).

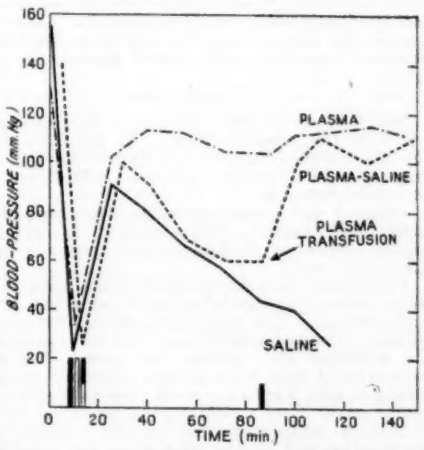
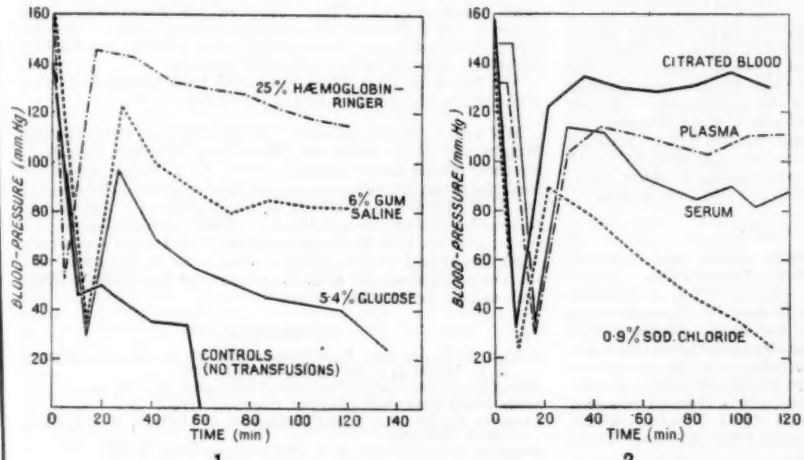


FIG. 3—Average behaviour of blood-pressure of animals transfused with plasma (7 experiments), saline (5 experiments) and plasma-saline 1 : 1 (3 experiments). The plasma-saline tracing also demonstrates the effect of a further transfusion of plasma, suggesting that recovery depends on the colloid osmotic pressure of the plasma. The black and white columns represent the relative volumes of plasma and saline transfused.

Serum.—In theory serum should give results as satisfactory as plasma because it has a similar colloid osmotic pressure ; from the practical point of view it has the advantage of being more easily prepared. Table *i* shows the results of transfusion with fresh untreated cat serum. It is noteworthy that 5 out of the 7 cats had a reaction soon after the beginning of the transfusion ; the respiration ceased, or almost ceased, and the blood-pressure fell sharply ; 3 of these reactions were very severe and the animals looked like dying. Moreover, the blood-pressure, after recovery from the reactions, declined again in all animals.

Brodie (1900) observed reactions after serum injection in cats and stated that he was unable to obtain these in other animals. Three similar though not identical experiments which we carried out on dogs produced both a comparable immediate reaction and a subsequent drop of blood-pressure (table *j*). We concluded that some toxic substance absent from plasma was present in serum. The literature discussing the liberation of physiologically active substances in serum has been reviewed by Amberson (1937) who states that "blood plasma is to be preferred to serum because of the formation, in the latter, of vaso-dilator or constrictor substances produced in the act of clotting." A similar conclusion on the toxicity of serum seemed to have been reached by Brodin and St. Girons (1939), Doan (1927) and others.

We thought that the process of drying might remove such substances, and undertook three experiments using serum which had been dried and then redissolved in water. The results were much the same as those already described (table *k*). Bond and Wright (1938) and Levinson, Neuwelt and Necheles (1940) have reported reactions when using dried serum, while Best and Solandt (1940b) say that "in experimental work sera which produce undesirable reactions are discarded." The



FIGS. 1 and 2.—Blood-pressure readings after rapid removal of 50% of the calculated blood-volume and immediate replacement with various fluids.

same investigators have concluded that serum gives satisfactory therapeutic results in animals. In none of their papers has the action of serum been contrasted under standard conditions with that of plasma.

DISCUSSION

We have placed the substitutes used in the following order of therapeutic value: (1) plasma; (2) serum; (3) hæmoglobin-Ringer; (4) gum-saline; (5) red cells suspended in crystalloid solution; and (6) isotonic saline or isotonic glucose.

Charts 1 and 2 summarise the blood-pressure readings after replacement with various fluids. Additional effects such as renal damage or respiratory disturbance are not shown.

Plasma was the only substitute whose value consistently approximated to that of whole blood in the treatment of hæmorrhage. The remaining substitutes gave inferior results. Hæmoglobin-Ringer was the most effective of the solutions after plasma and serum, but it must be remembered that hæmoglobin solutions produce renal changes, and for this reason gum-saline or even saline might prove more satisfactory in practical resuscitation.

Certain difficulties still present themselves in the preparation and storage of plasma, the most formidable being the ease with which it becomes infected. In order to overcome this, methods of removing water from the plasma and keeping it as a dry powder have been evolved. Recently Edwards, Kay and Davie (1940) have published a method of drying at 37° C. under low pressure, and the M.R.C. Serum Drying Unit, Cambridge, dry from the frozen state by a modification of the method employed by Flosdorf and Mudd (1938). Fresh cats' plasma (citrated) was pooled and divided into two parts, one of which was sent to Dr. T. B. Davie and one to Dr. Greaves at Cambridge. Table *l* and *m* show the effects obtained with these plasmas after they were made up to their original volume with sterile pyrogen-free water immediately before transfusion. It can be seen (table *l*) that Davie's method appears to produce changes in the plasma which cause a drop in blood-pressure, sufficient to kill these very shocked animals. Cats with a normal blood-pressure given 15 c.cm. of this plasma showed a temporary drop of 30–40 mm. Hg. Plasma dried from the frozen state seems to give fairly satisfactory results but is therapeutically inferior to the undried plasma (table *m*).

Another method of eliminating infection from plasma is by filtration. The method of filtration described by Bushby, Buttle and Whitby (1940) appears neither to detract from the resuscitating properties of the unfiltered plasma nor to add any toxic products to it. Table *n* shows the results obtained with cat plasma treated by this method; from the experimental point of view this appears to be the best method of overcoming the problem of infection.

Another method used in preparing plasma is to dilute it with an equal volume of normal saline. After the administration of such diluted plasma (table *o*) the blood-pressure at first rises and then drops, presumably as the crystalloid solution leaves the circulation. It can be restored to its normal level by a further transfusion of whole plasma equal in volume to the saline diluent (chart 3). If it is possible to overcome the difficulties of infection and storage, plasma containing a little anticoagulant is superior to either dried or diluted plasma.

CLINICAL APPLICATION

There can be little doubt that saline and glucose behave in man as they do in these experiments. There is also evidence that gum-saline (Keith 1919, Amberson 1937) and hæmoglobin-Ringer solutions (O'Shaughnessy, Mansell and Slome 1939) have the same effects when administered intravenously in man as in cats and are open to the same objections. The literature on plasma transfusions is scanty, but available work indicates that results comparable to ours have been obtained in clinical practice (Strumia, Wagner and Monaghan 1940, McClure 1939, Lehman 1939, Brodin and St. Girons 1939, Brennan 1940, Tatum, Elliot and Nassett 1939).

The relative merits of plasma and serum seem important. In the cat we have found two experimental objections to the use of serum: immediate reactions are more numerous than with plasma, and the return of the blood-pressure is not sustained. Various workers (Ravdin, Stengel and Prushankin 1940, Aldrich et al. 1938, Strumia, Wagner and Monaghan 1940) report reactions with serum in man. Strumia and his colleagues claim that these reactions were not seen when plasma was used, and prefer it for that reason. Drury (1940), on the other hand, claims that the incidence of reactions is no higher with serum than with whole blood. It may be that this difference can be explained by differences in methods of preparation. No data is yet available from human cases as regards the subsequent drop of blood-pressure.

Results with dried plasma seem to differ in man from those encountered in these experiments. Strumia, Wagner and Monaghan (1940), using plasma dried by the Flosdorf and Mudd method, report no reactions in human patients, while Davie (1940) has not encountered, in a small clinical series, the extreme reactions described above. More clinical data are required with plasma dried by both methods, especially in relation to patients with very low blood-pressures.

The Army Blood Transfusion Service (1940) has had encouraging results with filtered plasma in severe cases of shock and hæmorrhage. If the results of using saline are comparable in clinical and experimental work there is little reason to suppose that plasma-saline gives different results than those reported above.

Many people may soon have to make an immediate choice of a blood substitute for the treatment of wounded. The weight of evidence in the clinical, as in the experimental, field is at the moment in favour of using filtered plasma containing as little crystalloid diluent as possible. The success of a blood substitute depends on the elimination of delay between hæmorrhage and treatment; and this in turn depends on the substitute being suitable for storage over long periods. The question is, does plasma fulfil this condition? There is little literature on the use of plasma after storage, but what evidence there is—all of it clinical—suggests that plasma can be satisfactorily stored (Brennan 1940; Strumia, Wagner and Monaghan 1940; Tatum, Elliot and Nasset 1939; Army Blood Transfusion Service 1940). We believe that a strong case has been made out for extensive preparation and subsequent clinical trial of such plasma.

SUMMARY

Since blood cannot usefully be stored for longer than a few weeks a substitute capable of being accumulated in large stocks is needed.

Under standard experimental conditions the therapeutic actions of various blood substitutes have been compared with those of whole blood and the conclusion is reached that plasma is the only one which, in the cat, consistently gives results approximate to those obtained with whole blood. The other substitute solutions we place in the following descending order of value: serum, hæmoglobin-Ringer, gum-saline, red cells in crystalloid solution, isotonic saline, isotonic glucose.

We conclude that filtration is the best method of overcoming the danger of plasma infection.

We wish to thank Colonel L. E. H. Whitby, Prof. Samson Wright, Dr. A. N. Drury and Major H. L. Marriott, R.A.M.C., for their advice and criticism; Prof. R. J. Brocklehurst for facilities in the physiological department of Bristol University; Dr. J. W. Trevan for facilities in the Wellcome Physiological Research Laboratories and Dr. A. C. White for his collaboration there; also Dr. R. I. M. Greaves and Dr. T. B. Davie, who kindly dried serum and plasma for us. One of us (A. K.) gratefully acknowledges financial assistance from the Leverhulme Trust both before the war and since.

REFERENCES

Aldrich, C. H., Stokes, J., Kilmingsworth, W. P. and McGuinnee, A. C. (1938) *J. Amer. med. Ass.* **111**, 129.

Amberson, W. R. (1937) *Biol. Rev. Camb. phil. Soc.* **12**, 48.

Army Blood Transfusion Service Records. 1940.

Aubertin, E., Lacoste, A. and Castagnou, R. (1939) *C.R. Soc. Biol., Paris*, **132**, 129.

Baker, S. L. and Dodds, E. C. (1925) *J. exp. Path.* **6**, 247.

Blalock, A. (1934) *Arch. Surg.* **29**, 837.

References continued on opposite page

NUTRITIVE VALUE OF WHITE FLOUR WITH VITAMIN B_1 ADDED AND OF WHOLEMEAL FLOUR

By Harriette Chick, C.B.E., D.Sc. Lond. and Manc.

(*From the Division of Nutrition, Lister Institute*)

The experiment here described was made in consequence of the proposal made from the Ministry of Food to reinforce the white flour used for making bread by adding pure vitamin B_1, in order to make its nutritive value more nearly equal to that of wholemeal. White flour contains much less vitamin B_1 than wholemeal flour, but this is only one of a series of relative defects. These were enumerated recently in a manifesto issued from the Accessory Food Factors Committee of the Lister Institute and Medical Research Council, which recommended that flour used for making bread should contain at least 80–85% of the wheat grain, the outer layers of the bran and cuticle only being rejected (see *Lancet*, Aug. 3, 1940, p. 143). Ordinary "straight-run" white flour (73% extraction) is not only poorer than wholemeal flour in vitamin B_1 but also has a lower content of B_2 vitamins, minerals and protein. Further, experiments carried out in this division have shown the combination of proteins in wholemeal flour to have a higher nutritive value for growth, weight for weight, than those of the endosperm.

The vitamin-B_2 complex includes (1) riboflavin, (2) nicotinic acid, (3) vitamin B_6 and (4) the substances grouped under the name "filtrate factor." One of the filtrate-factor group has been isolated in a pure state as pantothenic acid; this group also contains a substance or substances known to be connected with the prevention of certain forms of anæmia. Nos. (1) and (2) certainly, and Nos. (3) and (4) probably, are vitally concerned in human nutrition. All are essential for nutrition of the pig and dog, and all except nicotinic acid are needed for satisfactory growth and health of the rat.

It therefore seemed worth while to compare experimentally the nutritive values of white and wholemeal flour, when the deficiencies of the former in vitamin B_1, in fat-soluble vitamins, in protein and in minerals were made good but any difference in B_2 vitamins was uncorrected.

EXPERIMENTAL DETAILS AND RESULTS

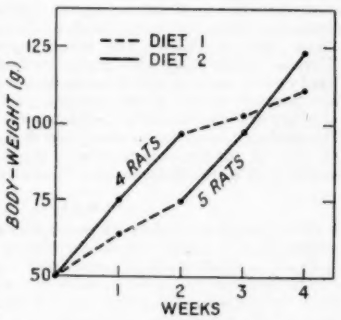
Two diets were arranged, consisting as largely as possible of white flour and wholemeal flour respectively, with the addition of a salt mixture to remedy the known defects of cereals in this respect and of extra protein in the form of casein to bring the amount of protein in the diet up to the optimum proportion for the growing rat. Pure vitamin B_1 in optimum amount was given to the rats on the white-flour diet. The diets had the following composition:—

DIET 1 (white flour)	%
Straight run white flour, 73% extraction	88
Casein, purified	6
Cotton-seed oil	4
Salt mixture (McCollum No. 185)	2
With 10 µg. pure vitamin B_1 and 80 mg. cod-liver oil daily.	

DIET 2 (wholemeal)	%
Wholemeal flour	82
Pure maize starch	6
Casein, purified	6
Cotton-seed oil	4
Salt mixture (McCollum No. 185)	2
With 80 mg. cod-liver oil daily.	

The samples of wholemeal flour and straight-run white flour (73% extraction such as is generally used for making white bread) were obtained from the same grist. This was a mixture of Manitoba, Australian and other wheats, being milled for general use in a large commercial flour mill. The protein contents ($N \times 5{\cdot}7$) of the white and wholemeal flours were 12·1 and 13·0%. Purified casein, 6%, was added to each diet and the proportion of protein in the final ration reckoned on dry weight (dried at 105–110° C.) was 18·5% in diet 1 (white flour) and 18·3% in diet 2 (wholemeal). To the diets when prepared 60 c.cm. of water was added to every 100 g. of mixture and the whole cooked by steaming for about an hour, since this was known to make cereal diets more acceptable and better utilised by rats (Boas-Fixsen, Hutchinson and Jackson 1934).

A litter of nine young rats (Norwegian pied Lister Institute strain), immediately after weaning and of weight ranging from 37 to 41 g., received a complete synthetic diet for a week, after which the weights had increased to from 47 to 54 g. At this stage they were divided into two groups. Five (2 male, 3 female) received diet 1 with 10 µg. pure vitamin B_1 in solution and 80 mg. cod-liver oil daily, these being given separately with a dropping pipette to each animal. The four rats (2 male, 2 female) having diet 2 received 80 mg. cod-liver oil daily.



Average rate of growth in the two groups of rats.

The rats were kept in cages raised on metal supports above trays containing the usual bedding, the floors of the cages being made of open-mesh wire to hinder the rats from eating their fæces. The lower tray was covered with a perforated zinc sheet, on which was placed two thicknesses of filter paper to catch any fragments of the food that might be scattered. These were separated from the fæces, dried at 105–110° C. and the dry weight subtracted from that of the food given, in order to estimate the food intake. The fæces were also collected, moistened with N/10 sulphuric acid to prevent loss of ammonia, dried and weighed. For the first two weeks two rats were together in one cage, after this all were kept in separate cages.

MAJOR BUTTLE AND OTHERS: REFERENCES (*continued*)

Bayliss, W. M. (1918) Intravenous Injection in Wound Shock, London.
Best, C. H. and Solandt, D. Y. (1940a) *Brit. med. J.* **1**, 799.
— — (1940b) *Ibid*, **2**, 116.
Bond, D. D. and Wright, D. G. (1938) *Ann. Surg.* **107**, 500.
Brennan, H. J. (1940) *Brit. med. J.* **1**, 1047.
Brodie, T. G. (1900) *J. Physiol.* **26**, 48.
Brodin, P. and Saint Girons, F. (1939) *J. Amer. med. Ass.* **113**, 2072.
Bushby, S. R. M., Buttle, G. A. H. and Whitby, L. E. H. (1940) *Lancet*, **2**, 131.
Christie, A., Phatak, N. M. and Olney, M. B. (1935) *Proc. Soc. exp. Biol. N.Y.* **32**, 670.
Coller, F. A. and Maddock, W. G. (1936) *J. Amer. med. Ass.* **107**, 1522.
Davie, T. B. (1940) Personal communication.
Doan, C. A. (1927) *Physiol. Rev.* **7**, 1.
Drinker, C. K. (1927) *J. Physiol.* **63**, 249.
Drury, A. N. (1940) Personal communication.
Edwards, R. F., Kay, J. and Davie, T. B. (1940) *Brit. med. J.* **1**, 377.
Erlanger, J. (1921) *Physiol. Rev.* **1**, 177.
Flosdorf, E. W. and Mudd, S. (1938) *J. Immunol.* **34**, 469.
Hirshfeld, S., Hyman, H. T. and Wanger, J. J. (1931) *Arch. intern. Med.* **47**, 259.
Keith, N. M. (1919) *Spec. Rep. Ser. med. Res. Coun., Lond.* **26**, 8.
Kinsman, J. M., Spurling, R. G. and Jelsma, F. (1928) *Amer. J. Physiol.* **84**, 165.
Lehman, E. P. (1939) *J. Amer. med. Ass.* **112**, 1406.
Levinson, S. O., Neuwelt, F. and Necheles, H. (1940) *Ibid*, **114**, 455.
Mahoney, E. B. (1938) *Ann. Surg.* **108**, 178.
McClure, R. D. (1939) *J. Amer. med. Ass.* **113**, 1809.
Miller, J. R. and Poindexter, C. A. (1932) *J. Lab. clin. Med.* **18**, 287.
O'Shaughnessy, L., Mansell, H. E. and Slome, D. (1939) *Lancet*, **2**, 1068.
Rous, P. and Wilson, G. W. (1918) *J. Amer. med. Ass.* **70**, 219.
Ravdin, W., Stengel, A. and Prushankin, M. (1940) *Ibid*, **114**, 107.
Roberts, G. M. and Crandall, L. A. (1933) *Amer. J. Physiol.* **106**, 423.
Rossius, L. (1925) *Arch. klin. Chir.* **137**, 583.
Strumia, N. N., Wagner, J. A. and Monaghan, J. F. (1940) *J. Amer. med. Ass.* **114**, 1337.
— — — (1940) *Ann. Surg.* **111**, 623.
Studdiford, W. E. (1937) *Surg. Gynec. Obstet.* **64**, 772.
Tatum, W. L., Elliott, J. and Nassett, N. (1939) *Milit. Surg.* **85**, 481.
Wright, S. (1934) *J. Physiol.* **80**, 281.

The results are set out in the table and figure. During the first two weeks the average weekly weight increase on the white-flour diet (11·8 g. weekly) was about half of that on the wholemeal diet (22·8 g. weekly). The food intake in the former case was also less, the average being 35·3 g. dry weight of food as compared with 53·2 g. on the wholemeal diet. The digestibility of the white flour was superior, the weight of fæces passed being only about a fifth of that passed on the whole-meal diet, but the utilisation of the assimilated food was inferior; the

EXPERIMENTAL FINDINGS IN RATS ON DIET 1 (WHITE FLOUR WITH VITAMIN B_1 ADDED AND DIET 2 (WHOLEMEAL). BOTH DIETS CONTAINED ADDITIONAL PROTEIN, AS CASEIN, AND COD-LIVER OIL

Week of expt.	No. of rats	Diet	Av. weekly increase in wt. (g.)	Av. weekly food intake dry wt. (g.)	Av. dry wt. of feces (g.)	Dry food ingested corresponding to 1 g. wt. increase (g.)	Dry food assimilated corresponding to 1 g. wt. increase (g.)
1	5	1	12·6	33·8	1·11	2·70	2·59
2			11·0	36·8	1·12	3·34	3·24
3		2	23	54·5	5·32	2·37	2·14
4			25	63·2	6·49	2·53	2·27
1	4	2	25·5	49·7	4·83	2·15	1·76
2			20·2	56·7	5·82	2·80	2·51
3		1	5·6	53·1	2·43	9·24	8·82
4			9·5	55·3	1·87	5·82	5·63

average weight of dry food ingested during this period of two weeks corresponding to 1 g. increase in body-weight was 3·02 g. on the white-flour diet, while on the wholemeal diet it was 2·47 g. When allowance is made for the loss in the fæces these figures become 2·91 and 2·13.

At the end of the second week the diets were changed. For the next two weeks the five rats previously taking diet 1 received diet 2. They made an immediate spurt in growth with average weekly weight increase of 24 g., while those changed from diet 2 to diet 1 suffered an immediate check, the average increase falling to about 7 g. a week.

The inferiority of white compared with wholemeal flour shown in this experiment must be attributed to a shortage of the B_2 vitamins. Further work is now in progress to determine in which constituents of this complex white flour is most seriously deficient. Preliminary trials indicated that in diet 1 deficiency of riboflavin was probably the most serious, though lack of filtrate factor may also have limited growth. It is not likely that lack of vitamin B_6 was responsible, for cereals are known to be good sources of this vitamin (Birch, György and Harris 1935), which is distributed throughout the grain. Its presence has been demonstrated in starches of cereal origin, even when these have been highly purified (Chick, Macrae and Worden 1940).

SUMMARY

The nutritive value of straight-run white flour (73% extraction), tested on young growing rats, has been found inferior to that of wholemeal flour, even when the defects of the former in protein, minerals and vitamin B_1 have been corrected. The inferiority must be attributed to lack of B_2 vitamins. Experiments are now in progress to determine in which member or members of this group white flour is most seriously deficient.

I wish to acknowledge gratefully the assistance of the Research Association of British Flour Millers in procuring the samples of white and wholemeal flour; also the help of Mr. G. Flynn in the care of the animals. The work was made possible by the hospitality of Sir Charles Martin, at whose invitation the Division of Nutrition of the Lister Institute moved from London to Roebuck House, Chesterton, Cambridge, at the outbreak of war.

REFERENCES

Boas-Fixsen, M. A. B., Hutchinson, J. C. D. and Jackson, H. M. (1934) *Biochem. J.* **27**, 592.
Chick, H., Macrae, T. F. and Worden, A. N. (1940) *Ibid*, **34**, 580.
Birch, T. W., György, P. and Harris, L. J. (1935) *Ibid*, **29**, 2830.

SUBACUTE BACTERIAL ENDOCARDITIS TREATED WITH SULPHAPYRIDINE AND HEPARIN

By C. M. Fletcher, M.B. Camb.
FORMERLY HOUSE-PHYSICIAN AT ST. BARTHOLOMEW'S HOSPITAL, LONDON

The encouraging results recently reported by Kelson and White (1939) in the treatment of subacute bacterial endocarditis by the use of sulphapyridine and continuous 14-day heparinisation of the blood, may lead to its further trial in cases in this country. Difficulties encountered in a case recently treated by this method seem worthy of record. The object of the heparinisation is to restrict further thrombotic deposition on the cardiac valves and thus "to restrict the nidus and culture medium for bacterial growth, to prevent embolism from the freeing of fresh thrombus, and to check the growth of the vegetations so that proliferating fibroblasts may fill in the area thus limited." At the same time, and for a week before and after the 14 days of heparinisation, sulphapyridine is given for its bacteriostatic action.

CASE-HISTORY

A professional man had had chorea as a child and was known to have aortic and mitral valvular lesions. He led an active life until six weeks before admission to hospital, when he felt unwell and took to his bed. Thereafter he was feverish but his only other definite symptom was a patch of blindness in the right eye which developed ten days before his admission. A blood-culture a week before admission grew a *Streptococcus viridans*. For five days before admission he had taken 5 grammes of sulphapyridine daily.

On admission on Dec. 12, 1939, he was afebrile with pulse-rate 70 and respiration-rate 20. He looked ill, had a sallow complexion and was rather drowsy. There was a small hæmorrhage close to the right macula. A rough presystolic apical murmur and a high-pitched diastolic aortic murmur were present. The spleen could just be felt. On the 14th the sulphapyridine was discontinued, and the temperature began to rise to 100° F. in the evenings. Blood count: Hæmoglobin, 82%; red cells, 3,900,000; white cells, 10,000 (polymorphs, 80%). The urine contained a few red cells.

During the course of the next week a blood-culture showed the presence of *Streptococcus viridans*, and a shake culture yielded an average of 57 colonies per 1 c.cm. The temperature was still rising to 100° F. in the evenings, and a few petechial spots had appeared.

Since infective endocarditis due to *Streptococcus viridans* is almost invariably fatal, and since sulphapyridine or allied substances alone have not hitherto produced a permanent cure, it seemed justifiable to try treatment with heparin in addition to sulphapyridine.

On Dec. 22 1 g. sulphapyridine was given 4-hourly for 24 hours and thereafter continued 6-hourly; 300 mg. ascorbic acid was given daily for 3 days. The temperature came down to normal at once, but after two days began to creep up to 100·5° F. in the evenings. On Dec. 30 the clotting time (modified method of Lee and White) was 8 min. An intravenous infusion of normal saline was started into a vein in the left leg, 12,500 units of heparin A (see below) being added to each pint of saline. The rate of flow was 20 drops per min. (20,000 units in 24 hours). Next day the patient had two rigors, the temperature rising to 103·5° F. Clotting time: 5 minutes. On Jan. 1, 1940, the drip stopped owing to thrombosis in the vein. The cannula was removed and inserted into the other leg. Fresh heparin direct from the manufacturers was used in the same concentration, but the rate of drip was increased to 30 drops per minute. Next day the patient had two rigors (T. 103° F.). Clotting time, 5 min. On the 3rd the clotting time was 6 min. In the afternoon the drip stopped again owing to venous thrombosis. Next day the cannula was inserted into the right arm. The concentration of heparin was raised to 15,000 units per pint and the rate was kept at 30 drops per minute. Platelet count: 374,000. On the 5th the clotting time was 4 min. In the evening the drip stopped owing to venous thrombosis.

Treatment had been continued up to this point in the hope that with prolonged therapy success would be achieved, for the dose of heparin that had been used was greater than that used by Kelson and White (1940). But after the third failure it was decided that the heparin must be at fault, and all treatment was suspended while tests were carried out on the brand of heparin which had been used (heparin A), a specimen bottle obtained from another firm (heparin B) and some solution of crystalline heparin which had been sent to Prof. R. V. Christie by Prof. C. H. Best from the Connaught Laboratories at Toronto (heparin C). These tests, performed on the blood of nine convalescent patients, showed that the advertised units of the three brands of heparin bore no relation to their relative anticoagulant activity. One unit of heparin C was found to be approximately equivalent to 5 units of heparin B and to 20 units of heparin A (see table).

RELATIVE VALUES OF HEPARINS A, B AND C

—	Units of heparin required to prolong clotting time of 2 c.cm. blood in vitro to—		
	20 min.	30 min.	40 min.
Heparin A	9	21	37
Heparin B	2	5	10
Heparin C	0·5	1	1·5

After these experiments had been completed, my attention was drawn to the decision of Murray and Best (1938) to change the size of the heparin unit to five times that previously used. The advertised unit of heparin C was presumably on this new scale. This accounted for the difference between heparin C and heparin B. The further difference of heparin A remained unexplained. The reason for the failure of our attempts at heparin therapy in the present case was now obvious and it was decided to make a further attempt, using heparin C.

By this time the patient was considerably worse, he was developing frequent and extensive petechial spots, had pains in several joints and an attack of severe and persistent pain in the left side suggested a splenic infarct.

On Jan. 19 a shake culture of the blood gave an average of 159 colonies of *Streptococcus viridans* per 1 c.cm. The white-cell count was 9000. On the 22nd sulphapyridine, 1 g. six-hourly, was started, and the temperature which had been rising to 101° F. in the evenings fell to normal for two days, but thereafter began to creep up to 101° F. again. Petechial spots continued to appear. On the 28th shake culture of the blood yielded an average of 22 colonies per 1 c.cm. At noon an intravenous infusion of normal saline containing 10,000 units of heparin C to the pint was started into the left arm; the rate of flow was 18 drops per minute. Shortly *before* the infusion the patient had a mild rigor which sent the temperature to 102° F. After one pint had been given the clotting time was 5 min. and the rate of flow was increased to 30 drops per min. Next day, 20,000 units of heparin having been given in 24 hours, the clotting time was 6½ min. The concentration of the heparin in the infusion was increased to 13,000 units per pint, and the rate of flow was increased to 40 drops per min. A rigor followed by a rise of temperature to 104° F. occurred an hour after the increase in rate of flow. On the 30th 26,000 units having been run in during 16 hours, the clotting time was 22½ min. The rate of flow was maintained at 40 drops per min. During the night there was another rigor with a rise of temperature to 104° F. The cause of these rigors remained unexplained. On the 31st 50,000 units had been run in during 24 hours and the clotting time was 21 min. The rate of flow was maintained, the patient remaining comfortable. At 2 A.M. next morning he woke with violent headache and vomiting, followed by incessant retching. He became rapidly exhausted and died after two hours.

Post-mortem findings.—The body was well nourished and showed generalised pallor. There was a slight increase of fluid in the peritoneal cavity. The lungs were congested and œdematous. In the heart, there was some old thickening of the visceral pericardium; the valves on the right side were normal; on the left side there was some thickening and shortening of the chordæ tendineæ with papillomatous, semi-organised thrombus attached. The aortic valves were bicuspid, thickened and roughened at the margins, and on the line of closure there were pale firm projections one of which felt gritty in character. The spleen was large and had an infarct measuring 5 cm. by 5 cm. against the abdominal wall. The digestive system was normal. The left kidney was rudimentary. In the brain there was a small subarachnoid hæmorrhage in the occipito-parietal region, a hæmorrhage in the left frontal lobe and also one in the left lobe of the cerebellum. These hæmorrhages were the cause of death.

DISCUSSION

To render the blood of a patient less coagulable when he is suffering from a disease in which emboli are common is to run the risk of serious hæmorrhage. In many cases of infective endocarditis, however, administration of sulphapyridine temporarily sterilises the blood-stream and abolishes embolic signs. Thus the week of therapy by sulphapyridine alone, recommended by Kelson and White (1939), before starting the heparin, acts as a safeguard against serious hæmorrhage. In the present case this safeguard failed, for a positive blood-culture persisted and petechiæ continued to appear while the sulphapyridine was being given.

Three other cases have been reported in which hæmorrhage occurred during heparin treatment of subacute bacterial endocarditis—Kelson and White's fourth case, the case of Friedmann, Hamburger and Katz (1939) and that of Witts (1940). In all these sulphapyridine had failed to sterilise the blood. Out of the five other cases so far reported (all by Kelson and White) to have survived heparin treatment, only one had a positive blood-culture at the beginning of the heparinisation. In this case no improvement was obtained.

The conclusion suggested by this small series of cases is that the persistence of a positive blood-culture, and in particular the continued appearance of embolic signs, should contra-indicate heparin treatment. Swain (1940) using in-vitro tests in support of clinical findings demonstrated that some strains of *Streptococcus viridans* are susceptible to sulphapyridine, while others are unaffected. He suggests that heparin treatment should only be undertaken when such tests show that the infecting strain of *Streptococcus viridans* is amenable to chemotherapy.

The first attempt, in the present case, to make the patient's blood less coagulable failed; but a second attempt, made after in-vitro tests had been carried out, was successful. These tests suggested that the advertised units of different brands of heparin are widely different from each other; this is not surprising in view of the fact that the three brands investigated are standardised by different methods. Murray and Best (1938) have recently changed the value of their unit and standardise on a basis of weight of their crystalline material, while the other two brands still use the original unit but have different biological methods of standardisation. My tests also suggested that there is a variation in the activity of the same brand of heparin in different individuals. In view of these facts it is suggested that before heparin therapy is instituted in any case it may be helpful to determine by in-vitro tests the approximate amount of heparin that will be required to produce an adequate prolongation of the patient's clotting time. In the present case, where one unit of heparin added in vitro to 2 c.cm. of the patient's blood raised the clotting time to 3½ times its initial value, 50,000 units had to be given intravenously in the course of 24 hours to produce a fourfold prolongation of clotting time in vivo.

SUMMARY

A case of subacute bacterial endocarditis is described in which treatment by sulphapyridine and heparin was attempted, but the patient died from cerebral hæmorrhage.

This treatment is attended by a risk of vascular accidents. The cases so far published suggest that this risk may be greater when a preliminary course of sulphapyridine fails to sterilise the blood and to stop embolic signs.

An investigation into the relative activity of three different brands of heparin was made. There appeared to be a wide divergence in the activity of the advertised units. This disparity is at least in part attributable to

the fact that the methods of standardisation of these brands are all different.

I wish to thank Dr. E. R. Cullinan for his advice and for permission to publish this case; Professor Christie and Prof. L. J. Witts for their advice; and Dr. Joan Ross for the account of the autopsy.

REFERENCES

Friedmann, M., Hamburger, W. W. and Katz, L. N. (1939) *J. Amer. med. Ass.* **113**, 1702.
Kelson, S. R. and White, P. D. (1939) *Ibid*, **113**, 1700.
Murray, D. W. G. and Best, C. H. (1938) *Ibid*, **110**, 118.
Swain, R. H. A. (1940) *Brit. med. J.* **1**, 722.
Witts, L. J. (1940) *Ibid*, **1**, 484.

LATE EFFECTS OF SUBDURAL HÆMORRHAGE

By Eric A. Linell, M.D. Manc.
PROFESSOR OF NEUROPATHOLOGY, UNIVERSITY OF TORONTO

A study of 54 cases recorded in the files of the division of neuropathology, University of Toronto, has shown various types of clinical picture which may be produced by hæmorrhage into the subdural space.

Free hæmorrhage into the subdural space is a common incidental finding in cases of severe and rapidly fatal head injury. The hæmorrhage is usually seen as a film of blood, $\frac{1}{16}$–$\frac{1}{8}$ in. thick, evenly disposed in the subdural space covering the convex lateral surfaces of the cerebral hemispheres. In a considerable number of such cases the cause of the hæmorrhage is the traumatic rupture of a cerebral vein, most usually one of the superior cerebral veins as it crosses the subdural space to empty its blood into the superior sagittal sinus. Leary (1934) points out, however, that there are cerebral veins which cross the subdural space to reach the dura at a distance from one of the major venous sinuses, and if these are ruptured they will produce subdural hæmorrhage in atypical situations. The hæmorrhage is as a rule found over the hemisphere on the side which has received the injury, but in 8 of the 54 cases of this series the subdural hæmorrhage was over the opposite hemisphere only. Contre-coup subdural hæmorrhage is, therefore, an anatomical possibility in cases which show clinical evidence of cortical compression of the hemisphere on the side opposite to that of the injury. The hæmorrhage was bilateral in 12 cases.

CHRONIC TRAUMATIC SUBDURAL HÆMATOMA

The following 3 cases are reasonably typical of chronic traumatic subdural hæmatoma. This condition can be caused by a minor head injury which produces no other significant intracranial damage. The result of evacuation of the blood-clot is therefore as a rule satisfactory. The interval between injury and operation has varied in this series from eight days to nine years, the average being a few months.

Case 1.—A man of 64 had a slight injury to the left side of his head in February, 1932. He had more or less persistent headache, gradually becoming more severe, until early in June when he developed a right hemiplegia with some aphasia. The optic discs were choked. On June 20 a left subdural hæmatoma was evacuated through a burr-hole. Unsatisfactory convalescence led the surgeon to explore the right subdural space, from which a small hæmatoma was evacuated on July 1. After this the patient made a satisfactory recovery.

In cases in which the localising signs are not clear-cut it has become increasingly the rule in recent years to explore the subdural space on both sides by bilateral burr-holes. The following is an illustrative case.

Case 2.—A man of 66 received a minor blow on the back of his head in June, 1937. He was somewhat dazed for about an hour but recovered completely. Three months later he began to have attacks of bilateral frontal headache in some of which he vomited. At first the headaches disappeared if he rested in bed. They gradually became more severe, and came on every other day. There was some diminution of mental acuity for two or three weeks before his admission to hospital on Dec. 31. The only lateralising sign was a questionable left facial weakness. There was no papillœdema. A burr-hole in the right anterior temporal region made on Jan. 3, 1938, showed the dura mater to have the blue colour typically seen when a hæmatoma underlies the membrane. Exploration through a burr-hole on the left side showed no abnormality. The hæmatoma on the right side was then evacuated. The patient is still alive but shows considerable residual disability.

The following case, which came to autopsy, illustrates the gross pathological findings.

Case 3.—An inmate of a home for old men, aged 86, fell out of bed, fracturing his femur. He died of bronchopneumonia five days later. At the autopsy old bilateral frontal subdural hæmatomata were found which had obviously been present for a long time before the recent injury. They are illustrated in fig. 1, the more extensive hæmatoma being on the right side. Fig. 2 shows the atrophy of the frontal cortex underlying the hæmatomata, especially on the right side. The horizontal section through the cerebral hemispheres in fig. 3 demonstrates compression of the frontal cortex, more obvious on the right side. There is considerable senile arteriosclerotic thickening of the vessels in the subarachnoid space, and senile internal hydrocephalus is visible in the anterior horns of both lateral ventricles.

This third case was complicated by the patient's extreme age and by the presence of senile degenerative changes in his brain. No record of the injury which produced the hæmatomata could be obtained, and he falls, therefore, into a group of cases of subdural hæmatoma with no history of trauma. No information is available regarding any change in this patient's mental status after his admission to the institution two years before his death.

CASES WITH MENTAL SYMPTOMS

The important relationship between cortical compression by subdural hæmatoma and the onset of mental deterioration is illustrated by the following two cases. In the first mental deterioration began soon after the accident. In the second its onset was long delayed but traceable to a head injury.

Case 4.—A man, aged 61, was hit on the right upper part of the forehead by a steel cylinder in November, 1933. This rendered him confused and unsteady but he did not leave his work and the slight wound healed in a week. A fortnight later he began to suffer from headache which became very severe within a few days and was accompanied by tenderness of the right side of the scalp. He took large quantities of aspirin and remained at work. Five months after his injury, in April 1934, he became irritable and would often scream with the severity of the headache. He remained in bed for a week and then returned to work. From this time, however, he was mentally dazed. He would fall asleep at night on his return from work, sometimes in the middle of a meal, and he was difficult to arouse in the mornings. His irritability increased so that he was difficult to live with and he became careless about his table manners and dress. On June 4 his foreman sent him home, and next day his mental confusion became extreme. He urinated on the floor and ate his meals with his fingers. Later in that day he was found in a state of semi-collapse in a neighbour's garden which he had entered by mistake. He was certified and admitted to a psychiatric hospital. An encephalogram on June 13 showed displacement of the lateral ventricles to the left and the procedure was followed by a mild left hemiplegia which cleared up in 24 hours. A large right subdural hæmatoma extending backwards from the frontal pole almost to the occipital pole was evacuated by operation on the following day, but the patient continued to show symptoms of disturbed mentality until his death some years later.

Case 5.—A man received a head injury in an aeroplane crash in October, 1927. He had a short period of unconsciousness but apparently recovered completely. During the succeeding years he became severely depressed, with lack of interest and loss of initiative. The depression culminated in attempted suicide in October, 1938. A revolver bullet, fired obliquely, produced a depressed fracture in the right temporal region, with no penetration of the skull by the bullet. Four weeks later this area was explored by operation and the fragments of the depressed fracture were removed. Incision of the dura mater revealed a large mass of fibrous tissue, containing old blood-pigment, in the subdural space. Histological examination showed this lesion to be a subdural

FIG. 1—Bilateral old subdural hæmatomata from below. The more extensive hæmatoma is seen on the right side. (Case 3.)

hæmatoma of long standing. After the operation the patient's mental condition has much improved, though he still suffers a good deal of disability from his left hemiplegia.

In this case the finding of an old subdural hæmatoma was completely unexpected. Its successful removal nine years after the accident which produced it is of great interest.

INFECTED HÆMATOMA

Infection of a subdural hæmatoma is a very unfortunate complication, which, though rare in civilian injuries, may be expected to be fairly common in war wounds where the hæmatoma may be in direct continuity with a septic compound comminuted fracture of the skull. Only two such cases were found in this series, one of which is here described. Septic infection of the subdural space, in our experience, is invariably fatal, and its prevention is therefore highly important.

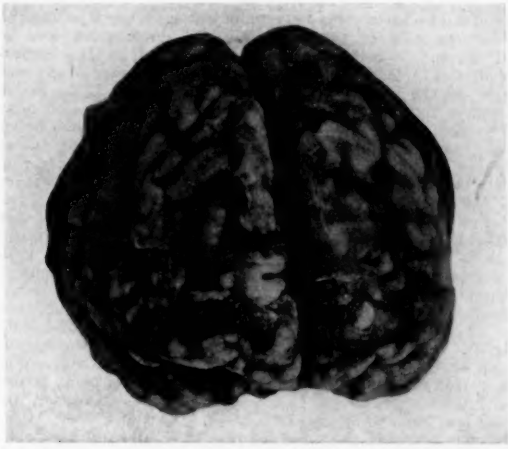


FIG. 2—Brain viewed from front, showing cortical atrophy by compression of overlying subdural hæmatomata, greatest on right side (left of photograph). (Case 3.)

CASE 6.—A man of 49 fell downstairs striking his head on a cement floor on Feb. 12, 1937. He was unconscious for twenty minutes, and on recovery complained of frontal headache and vomited. He was admitted to hospital next day. There was tenderness and œdema of the scalp over the left parieto-occipital region. The right knee-jerk was brisk and there was a questionable right extensor response.

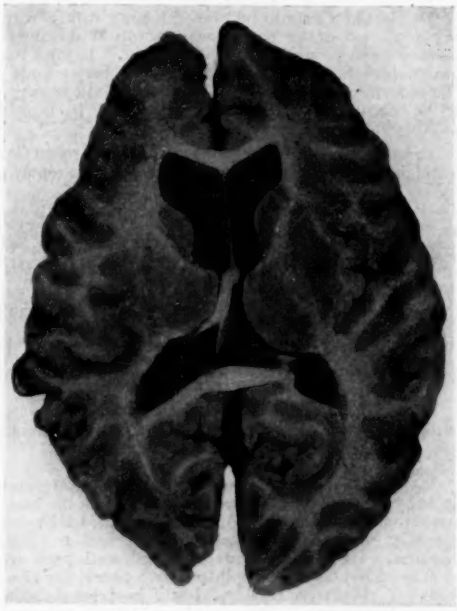


FIG. 3—Upper cut surface of horizontal section through cerebral hemispheres (case 3), showing frontal cortical compression, more evident on outer surface of right frontal lobe (left of photograph). Photograph also shows senile internal hydrocephalus of anterior horns of lateral ventricles, more marked on right side where cortical atrophy is greatest, and uniform senile arteriosclerosis of cortical vessels.

FIG. 4—Horizontal section through cerebral hemispheres of case 6, showing large subdural empyema caused by infection of chronic traumatic subdural hæmatoma compressing the cortex and white matter on lateral surface of left frontal lobe. Empyema has thick outer wall and somewhat thinner inner wall. Two abscess cavities in subcortical white matter of posterior part of left frontal lobe, probably caused by needle-puncture through infected subdural space. Anterior horn of left lateral ventricle has been compressed backwards and slightly to right. Photo also demonstrates difficulty of efficiently draining an infected subdural space.

Radiography showed no fracture of the skull. His cerebrospinal fluid pressure was 400 mm. of water. Two days later he developed pain in the left ear. His temperature rose to 101° F. and 30 cells per c.mm. were found in the cerebrospinal fluid. A bulging, reddened tympanic membrane was noted on the left side on March 1. By March 11 he had a complete right hemiplegia with aphasia, and operation next day disclosed a subdural abscess mixed with broken-down blood over the left frontal lobe. Pneumococcus, type 3, was isolated from this material. He improved temporarily but again became stuporous, and in spite of a further exploration on April 3 he gradually went downhill, dying on April 24. Post-mortem examination revealed a linear fracture of the left side of the occipital bone running forwards into the petrous portion of the temporal bone. The latter bone contained soft, slightly purulent material, continuous with a chronic infection in the left middle ear cavity. A large infected subdural hæmatoma was found extending backwards for 11·5 cm. from the lateral side of the left frontal pole (fig. 4). In the anterior 4·5 cm. the membranes of the hæmatoma were separated by purulent exudate and in this region the cortex showed severe compression. Further back, where the infected hæmatoma had been drained by operation, its outer and inner walls were in contact. Two small subcortical abscesses found in the posterior part of the frontal lobe were possibly caused by needling of the brain through an infected subdural space.

HÆMATOMA WITH NO KNOWN TRAUMA

Reference has been made (case 3) to an important group of subdural hæmatomata in which there is no history of trauma. In view of the trivial nature of the trauma which typically produces this lesion it is likely that a mild unreported head-injury was the causative factor in most if not all of these cases, especially since no other satisfactory cause of massive subdural hæmatoma has yet been described. The absence of a history of head trauma does not rule out the presence of subdural hæmatoma and such absence may make its diagnosis extremely difficult; this is illustrated by the following case, one of three which came to autopsy within a few months.

CASE 7.—A man of 71 had had intermittent headaches for six months, during a fishing-trip in 1939. No history of head injury was elicited, in spite of careful questioning. One evening during the trip he complained of headache and drowsiness which forced him to lie down. On his way home on Sept. 10 he became very drowsy and his friends had to help him into the house. He had a meal, however, and went to bed and was up and around next day. He then collapsed with severe frontal headache and unsteadiness of the legs. This attack was followed by loss of memory, incoherent speech and inability to recognise his friends. He developed paralysis of the right arm shortly before his admission to hospital on Sept. 15. On admission no difference in the tone of the two upper limbs was noted. The abdominal reflexes were absent. Babinski's sign was present on both sides. The cranial nerves were normal and sensation was unimpaired. Next day all his limbs were flaccid, with absent reflexes in the legs. On Sept. 17 the left pupil was larger than the right and neither reacted to light. There was a flaccid quadriplegia, but reflexes were still obtainable in the arms. The cerebrospinal fluid showed a pressure of 50 mm. of water, with 50 cells per c.mm.; Pandy's test was weakly positive. He died on the following day with a clinical diagnosis of basilar thrombosis. Post-mortem examination revealed a large left subdural hæmatoma, thickest over the frontal lobe but extending backwards over the parietal and temporal lobes. The colour of the blood in the hæmatoma suggested that it was at least ten days old. There was severe herniation of the left hippocampal uncus, with stretching of the oculomotor nerve sufficient to account for the enlargement and fixity of the left pupil. The left cerebral hemisphere was severely compressed by the hæmatoma, with deviation of the midline structures to the right. This had caused the right cerebral peduncle to impinge against the sharp inner edge of the tentorium cerebelli (Kernohan 1929). Microscopically (figs. 5 and 6) there was acute traumatic necrosis, with hæmorrhage, in the area of the right pyramidal tract at the line of compression by the tentorium. These findings explain the presence of a flaccid quadriplegia for two days before his death. There was also a linear strip of hæmorrhage running through the pons at the junction of its upper and middle thirds.

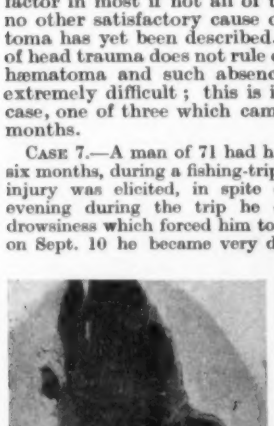


FIG. 5—Right half of midbrain of case 7, under low power (× 4) stained with Mallory's phosphotungstic acid. Shows severe traumatic necrosis and hæmorrhage in right cerebral peduncle involving pyramidal-tract fibres. Red nucleus is seen lying mesial to peduncle; aqueduct is visible in upper part of photograph.

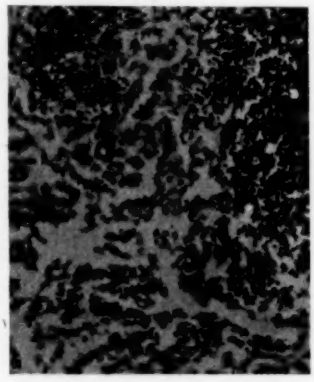


FIG. 6—Higher magnification (× 120) of fig. 5, showing severe traumatic necrosis and hæmorrhage in right cerebral peduncle.

This case illustrates how a subdural hæmatoma may rapidly produce, by its secondary pressure effects, a confusing clinical picture mimicking an acute pontine softening secondary to thrombosis of the basilar artery.

SUMMARY

The various symptoms and pathological changes produced by subdural hæmatoma, and the results of evacuation of the hæmatoma, are illustrated by examples from 54 cases. Chronic hæmatoma may follow a minor injury with no other serious intracranial damage and there may even be no history of trauma. It may lead to mental deterioration, beginning either soon or long after the hæmorrhage. Infection of a hæmatoma is rare, but may be commoner after war-wounds; it is almost invariably fatal.

I wish to thank members of the staff of the Toronto General Hospital and Dr. Arthur Elvidge for permission to report these cases.

REFERENCES

Leary, T. (1934) *J. Amer. med. Ass.* **103**, 897.
Kernohan, J. W. and Woltman, H. W. (1929) *Arch. Neurol. Psychiat., Chicago*, **21**, 274.

A CASE OF AXILLARY EMBOLECTOMY

BY JAMES F. HUGHES, M.D. Melb., M.R.C.P.
LATE HOUSE-PHYSICIAN AT THE BRITISH POSTGRADUATE MEDICAL SCHOOL; AND

PHILIP BERRY, M.D. Lond.
SENIOR SURGEON AND DEPUTY MEDICAL SUPERINTENDENT, ST. NICHOLAS HOSPITAL, PLUMSTEAD

A MAN, aged 29, was admitted to Hammersmith Hospital on April 25, 1940. He said that he had had rheumatic fever at the age of 7 and again at 24; he had apparently made a good recovery and had no residual symptoms. He complained of cough and pain in the right side of his chest, associated with fever, for the past four days. He was restless, toxic and semi-delirious, with mobile alæ nasi. Temperature 104° F., respiration-rate 40, pulse-rate 120 and B.P. 140/60. The pulse was regular but dicrotic. The apex-beat was 4 in. from the midline in the fifth left intercostal space. There was a presystolic thrill and murmur at the apex, and a blowing diastolic murmur at the base conducted down the left

border of the sternum. There was consolidation of the lower lobe of the right lung.

Next day he developed auricular fibrillation with a ventricular rate of 160 per min.; this was confirmed by an electrocardiogram. There was slight generalised venous engorgement, for which he was given 1 mg. of digoxin intravenously followed by two further injections, of 0·5 mg. each, at four-hourly intervals; this was followed by tab. digit. folia. gr. i, t.i.d. and sulphapyridine. By the fourth day the ventricular rate was 80 and the patient was afebrile. His heart was still fibrillating.

On the eighth day he complained that his right forearm, from 2 in. below the elbow-joint, had gone numb and that he had pins and needles in his finger-tips; just below the elbow he had the sensation of a constricting band; there was no pain but his fingers felt stiff. These symptoms had developed only five minutes before he was seen by one of us (J. F. H.). The colour of the limb was unchanged, but the fingers were abnormally cold and he was able to move them only with great difficulty. No pulsation could be felt in the radial, ulnar or brachial arteries. The axillary artery however was pulsating strongly, and this pulsation stopped at the level of the anterior axillary fold. A diagnosis was made of embolism at this site. The patient was kept warm in bed under observation. An hour and a half later the right forearm had become completely numb to the level of the elbow and the fingers could only just be moved. The hand was cool and the fingers pale, cold and cyanotic. Strong pulsations could be felt in the axillary artery and weaker pulsations in the brachial to just above the elbow, where all pulsation ceased. In view of these findings it was decided to perform embolectomy at once.

OPERATION

An incision was made under local anæsthesia over the lower part of the brachial artery, because it was thought that the embolus had moved on to the bifurcation of that artery. The artery was found to divide high up and the point of bifurcation was not seen. Both the radial and ulnar arteries were pulseless and contracted. As usual the ulnar artery was the larger; it was controlled by two loops of tape passed under it, and a small incision was made into the lumen. There was no bleeding and no clot in the proximal part of the artery, but a small clot was removed from the distal part. A ureteric catheter was then passed upwards towards the bifurcation of the brachial artery, in the hope of dislodging any clot impacted there, but none was obtained. Another incision was made, under local anæsthesia, over the upper part of the brachial artery. When the brachial artery was isolated the pulsation was found to be transmitted from the axillary artery. The brachial was now controlled in its turn by two loops of tape, and a small incision was made in it. It was found to be empty, but on milking the axillary artery downwards a clot about 6 cm. long was expressed, followed by a spurt of blood. There was no bleeding from the distal end of the artery. Bleeding was easily controlled and the incision in the artery was closed by a continuous silk suture. The colour of the hand had now improved considerably and the fingers were warmer. The incision in the ulnar artery which had been covered with packs of sodium citrate solution was then examined but no bleeding was taking place. A small nick was made in the radial artery and this bled freely; this and the incision in the ulnar artery were closed.

POSTOPERATIVE COURSE

Two hours after operation the hand was warm and pink and there was good circulatory return after compression of the nailbed. No pulsation could be felt in the radial artery at the wrist but paræsthesia had almost gone and power was returning to the fingers. Eleven hours after operation the radial pulse could just be felt at the wrist. All subjective symptoms in the hand and forearm had disappeared. There was still right basal lobar consolidation and the heart was fibrillating with a ventricular rate of 80. No further embolism occurred and on the fourth day after operation the heart returned to normal rhythm. The patient was discharged from hospital on May 30 by which time his lung had completely cleared, he had good cardiac reserve and a perfectly functioning arm in which all the arteries now pulsated, though the right radial pulse was still weaker than the left.

DISCUSSION

de Takats[1] says that "while embolectomies on the upper extremity are uniformly successful they are unnecessary, for one can get along without them," and this view is commonly held. Gangrene is admittedly an uncommon sequel to embolism of the upper extremity but it may occur. As de Takats remarks, there is a strong tendency to spontaneous recovery, but trophic changes have been described in the arm after embolism treated conservatively. The main reason why operation is urged by many surgeons is because secondary thrombosis beyond the embolus sets in after a few hours. In our case this had clearly taken place, since clot was removed from the distal part of the ulnar artery. It is probable also that clot was present in the upper part of the ulnar artery, but the radial artery was still patent.

In view of the large percentage of spontaneous recoveries in embolism of the upper extremity, conservative treatment should be tried, but if the limb fails to improve after four to six hours embolectomy should be performed. We operated in this case because of the poor general circulation at the time of the embolism and the progressive deterioration of the limb despite conservative treatment. Spontaneous recovery might have taken place later if vigorous vasodilating measures had been applied.

We wish to thank Dr. Allen Daley, medical officer of health to the L.C.C., and Sir Thomas Carey Evans, medical superintendent of Hammersmith Hospital, for permission to publish this case.

BRUCELLA MELITENSIS IN COW'S MILK

BY F. W. DUKE

SENIOR TECHNICIAN AT THE COUNTY BACTERIOLOGICAL AND PATHOLOGICAL LABORATORY, STAFFORD

WHEREAS examples of *Brucella abortus* in cow's milk are common, *Br. melitensis* has not so far as I am aware been found in cow's milk in this country before it was isolated in this laboratory. The distinctions between the types are of more than academic interest, since it is generally agreed that the melitensis strain is far more virulent to human beings than the abortus strain.

Since the practice was introduced by Dr. John Menton in January, 1937, all milk sent to this laboratory for testing for tuberculosis has at the same time been tested for brucellosis of the three types. Provision is made for the detection of *Br. melitensis* and *Br. suis* as well as *Br. abortus*. This practice has been continued, although all strains isolated had hitherto proved to be *Br. abortus*. When therefore a culture of brucella was obtained aerobically inquiries were at once made, since *Br. abortus* requires 10% carbon dioxide for primary culture.

The milk was a bulk sample from an accredited herd of seventy-six cows. At no time during the last 14 years had there been any goats on the farm. A guineapig was killed 44 days after inoculation with the sediment; its serum was positive to the agglutination and precipitin reactions for brucella. The organism recovered from the bone-marrow and the spleen grew well aerobically in primary culture in 7 days on liver-extract agar; no H_2S was produced. Luxuriant growth occurred, aerobically, on the dye media, thionin, fuchsin, methyl violet and pyronin. The organism was agglutinated by a monospecific melitensis serum, but not by a monospecific abortus serum. The organism proved to be virulent to the guineapig, killing two, in 29 and 64 days respectively. Single samples of milk were obtained from individual cows still available in this herd. Three cows provided samples from which *Br. melitensis* was recovered, judged by the criteria already detailed. The guineapigs were injected by Dr. A. J. McCall.

This work was begun under the direction of Dr. John Menton, who died before its completion.

I wish to thank Dr. W. D. Carruthers, medical officer of health for Staffordshire, and Dr. J. L. Edwards, senior assistant bacteriologist and pathologist to the County Laboratory, Stafford, for permission and encouragement to publish this work.

1. de Takats, G. *J. Amer. med. Ass.* 1938 **110**, 1075.

DETECTION OF TUBERCULOSIS AMONG RECRUITS

By G. Gregory Kayne, M.D. Lond., M.R.C.P., D.P.H.
TUBERCULOSIS MEDICAL OFFICER, MIDDLESEX COUNTY COUNCIL.*

THE controversy concerning miniature screen photography of the chest has not yet resulted in the application of this (or any other) method of mass radiography to the examination of recruits for the armed forces, but it has advertised the fact that among men of military age who consider themselves healthy, or in whom at all events the presence of pulmonary tuberculosis is not suspected, radiological investigation (followed by the necessary supplementary examinations) will detect active tuberculous lesions in from 0·5 to 2% or more. At present the only procedure by which it might be hoped to discover at least some of these men is that which allows medical boards to refer selected recruits to the local tuberculosis officer for an opinion.

As far as I know, no precise guiding rules have been issued to tuberculosis officers, either on the investigations they should carry out or on the criteria to be adopted in assessing fitness for the Services as far as the chest is concerned. Is the tuberculosis officer, for instance, obliged to carry out an X-ray examination in each case? Only a small proportion of tuberculosis dispensaries have an X-ray apparatus on the premises, and in many instances the patient is sent to a hospital and reliance is placed on a report from a radiologist often without special experience in chest radiography. Is the tuberculosis officer to report merely on whether or not a tuberculous lesion is present, or is he also to express an opinion on non-tuberculous conditions? If the latter he will need to possess a wide experience of chest disease in general and have at hand facilities for carrying out special investigations, such as bronchography and bronchoscopy.

The men referred to me can be classified into two groups. The first group comprises those who are, or who recently have been, under supervision at the dispensary for active, quiescent or arrested tuberculous disease. This information is presumably given by the recruit, and the medical board ask for a confirmatory report. This group, consisting of 30 men, need not be discussed further. The second group consists of men whom the medical boards presumably suspect of suffering from tuberculosis or some other condition of the chest. In the past few months 134 men were referred to me for the following reasons.

Reason for reference.	*Number referred.*
History of "pleurisy"	40*
History of "tuberculosis in family"	37†
History of stay in sanatorium or attendance at dispensary many years before	13‡
History of "pneumonia"	7§
History of empyema	2
History of spontaneous pneumothorax	2‖
History of rectal operations	2
Presence of symptoms	15
Presence of abnormal physical signs	4
Reason not stated and not apparent	12
Total	134

* In 6 instances also "tuberculosis in family," and in 1 instance also abnormal physical signs.
† In 1 instance also "tuberculosis in family," and in 1 instance also a history of "pneumonia."
‡ In 1 instance also "tuberculosis in family."
§ In 1 instance also history of spontaneous pneumothorax.
‖ In 1 instance also "tuberculosis in family."

The following procedure is adopted in my clinic in investigating recruits.

1. Both in regard to "tuberculosis in the family" and a history of "pleurisy," "pneumonia," and so on an endeavour is made in each case to assess how true the history is by appropriate questioning (e.g., whether the alleged consumptive relative had been to a sanatorium), and, when the man had been admitted to a hospital, by obtaining a report from that institution.

2. A radiogram is taken or X-ray screening is carried out after the physical examination in every case. If screening shows the slightest abnormality a radiogram is taken. This is also done when screening shows no abnormality but suspicious symptoms or physical signs are present. When symptoms or signs are present lateral films are also taken if the anteroposterior films show no abnormality. When the history, physical examination or radiograms suggest bronchiectasis or bronchial obstruction bronchograms are taken.

3. Sputum when available is examined for tubercle bacilli in every case irrespective of any other consideration.

4. In all recruits showing tuberculous foci (except an obvious calcified primary complex) radiograms are repeated after one or more intervals and sedimentation tests are carried out.

* The views expressed in this paper are those of the author, and do not necessarily represent those of the Middlesex county council.

DIAGNOSTIC FINDINGS

These were the findings among the 134 recruits.

Diagnosis.	*Number of recruits*
Bronchitis	16*
Emphysema	3
Bronchial asthma (treated for some years; recently produced positive sputum, but no other evidence whatever of active pulmonary tuberculosis found)	1
Saccular bronchiectasis	2
Silicosis	1
Congenital cystic disease of lung, with pleural involvement	1
Mitral stenosis, pulmonary congestion and fibrinous bronchitis	1
Localised collapse areas following influenzal bronchopneumonia	1
Congenital heart disease (opinion of cardiologist advised)	1
Pleural changes (from obvious pleural thickening with displacement of heart to filling of costophrenic angle)	19
History of pleural effusion in hospital	7
History of "pleurisy" at home	3
History of empyema (probably "necessitatis" in 1 instance)	4
History of "pneumonia"	2
History of probable effusion	1
History of "arthritis of all joints"	1
No history of illness	1
Tuberculous changes in the lungs	13
Total	58

* In 4 instances it was probably associated with infection of the upper respiratory tract; in 1 instance there were also arrested tuberculous lesions—this case is included below.

CASES SHOWING TUBERCULOUS CHANGES IN LUNGS

CASE 1.—Healed lesions (fibrosis and calcification) with presumably recent exacerbation. Admitted to sanatorium where a laryngeal swab found positive.
Referred because he "had been under observation twelve years before for ? tuberculous glands."

CASE 2.—Bilateral advanced phthisis. Died in hospital two months later. This man had been seen by his doctor several times who believed him to be suffering from bronchitis.
Referred because of symptoms and physical signs.

CASE 3.—Slight fibrotic shadows at both apices (remains of a postprimary dissemination—"Simon foci").
Referred because of a history of "pleurisy" at home.

CASE 4.—Calcified foci in upper half of one lung field. No history of illness. Reason for being referred not stated.

CASE 5.—Calcified focus in midzone (probably "round focus"). No history of illness.
Referred because of "tuberculosis in family."

CASE 6.—Scattered calcified nodules in both lungs. Man stated that he had been to a sanatorium in Switzerland seven years before. Referred because of this statement.

CASE 7.—Small infraclavicular shadow. Three monthly radiograms and sedimentation-rate tests, and absence of symptoms, appeared to show that lesion was not active, but it had not been present on a film taken elsewhere eighteen months before.
Referred because of "tuberculosis in family."

CASE 8.—Linear and nodular shadows at both apices suggesting fibrosis. Lesions not active. Had been in a sanatorium nine years before. Referred because of this history.

CASE 9.—Linear shadows at one apex, and trachea displaced to same side. Lesions not active. No history of illness.
Referred because of "tuberculosis in family."

CASE 10.—Linear shadows in each upper zone. Lesions not active. History of "pneumonia" at age of ten, after which he was sent to a sanatorium for several months. In sanatorium again for several months at sixteen. Quite well since. Referred because of this history.

CASE 11.—A few nodular shadows in one upper zone. Lesions not active. Was diagnosed as suffering from pulmonary tuberculosis ten years before and considered "recovered" in 1935. Referred because of this history.

CASE 12.—Calcified foci and fibrosis in each upper zone. Lesions not active. No history of illness.
Referred because of "?? P.S. at apex."

CASE 13.—Scattered calcified foci in one lower zone. Diagnosed as suffering from pulmonary tuberculosis in 1929 and considered "recovered" in 1934.
Referred because of that history.

To summarise, there were discovered:
Two cases of active phthisis (cases 1 and 2). Referred: one because of ? tuberculosis in childhood; one because of symptoms and signs.
One case of "quiescent" early lesion (case 7). Referred because of "tuberculosis in family."
Two cases of remains of postprimary dissemination (cases 3 and 5). Referred: one because of history of "pleurisy," unconfirmed; one because of "tuberculosis in family."
Five cases of healed phthisis with a history of treatment (cases 6, 8, 10, 11 and 13). All referred because of that history.
Three cases of healed phthisis without a history of treatment or illness (cases 4, 9 and 12). Referred: one because of reason unknown; one because of "tuberculosis in family"; one because of ? abnormal physical signs.

DISCUSSION

It appears that the main criteria adopted by the medical boards in selecting those who might be suffering from active or latent pulmonary tuberculosis were (1) a statement of "tuberculosis in the family"; (2) a statement of "pleurisy" in the past; and (3) a statement that the man had in childhood or adolescence been in a sanatorium or attended a tuberculosis clinic. The findings in the lungs in these cases show that by itself neither a history of "tuberculosis in the family" as usually obtained, confirmation being often impracticable without time-consuming inquiries, nor a history of "pleurisy" without definite evidence that the alleged illness really was a pleurisy is a fruitful criterion for discovering either active or arrested pulmonary tuberculosis.

What little rôle is played by such a family history may also be gathered from the fact that among 44 recruits with a history of tuberculosis in the family tuberculous pulmonary or pleural changes were found in 5, whereas among 90 recruits who gave no such history tuberculous pulmonary or pleural changes were found in 21 (pleural changes that could be attributed to an empyema or definite pneumonia are not included in these figures).

That little reliance can be placed on a man's statement that he has suffered from pleurisy, unless he had been admitted to hospital, is shown by the fact that among 9 recruits who had been admitted to hospital radiographic changes of pleural involvement were found in 7, whereas among 20 recruits who remained at home, but were told by their doctors that they had pleurisy, such changes were found in 4 only (pleural involvement was also found in 1 man who gave no history of illness, and in 1 man who said he had "arthritis of all the joints" eighteen months previously).

The next step is to compare the actual findings in regard to pulmonary tuberculosis with the expected findings based on results already published of radiological examination of similar "populations." Unfortunately there are no such figures for unsuspected tuberculosis among recruits in this country. Relying only on radiograms taken with a portable apparatus, Wingfield and Macpherson[1] found among over 2000 cases, adolescents between the ages of fourteen and twenty-one, drawn from an urban and semi-urban working-class population, "a definite incidence" of 0·65%, and "a possible incidence" of 1·08% of tuberculous lesions "of the adult type." (It is not known what proportion of these were active at the time of examination.) Hart, Hilton and Morland[2] found at University College Hospital that 26 (6·2%) of 417 students (aged mainly between twenty and twenty-five) showed "lesions considered of importance." Of these 26 cases, 9 (2% of the total number examined) had active or probably active tuberculous pulmonary or pleural lesions which were discovered *solely as the result of routine radiological examination.* In papers published from many other countries giving results of mass radiological examinations in adults (students, nurses, industrial employees, recruits), the incidence of active pulmonary tuberculosis *previously unsuspected* varies from 0·5 to 4%. Recently figures were published by Cooper[3] relating to recruits in Australia; active lesions were found in 0·55%.

In estimating the number of cases with active pulmonary lesions expected in any population of recruits one would obviously need to take into account the incidence of tuberculosis in the community from which the recruits originate, and also the efficiency of the tuberculosis scheme in that district. Where the scheme is efficiently organised fewer early cases are likely to be missed before they are seen by the medical boards, as the result of contact examinations, coöperation between general practitioners and tuberculosis officers, "training" of local practitioners by the tuberculosis officer, and so on. I understand that roughly 1–2% of the recruits that come before the medical boards are referred to tuberculosis officers, so that the total number of recruits from which those referred to me were selected was at least 7000. Even on the basis of 0·5% of unsuspected tuberculosis—the lowest figure among results published—we might expect 35 cases of active lesions among the 7000 recruits. Only 2 men with active disease, including 1 with very advanced disease that should have been diagnosed by his own doctor long before, and 1 with recently active disease were discovered in the men referred to me, so that from one batch of recruits no less than 33 men with active lesions were presumably admitted into the Services, and this figure might well be three or four times as high. Due allowance must be made for the possibility that some of these cases were rejected by the medical boards for other reasons; but in view of the small percentages of total rejections published this number is not likely to be significant, and up to the present I have not seen a single patient with phthisis at my clinic since the war began who had been rejected by the medical boards.[4]

CONCLUSIONS

These findings appear to confirm the view that without routine radiological examination the detection of unsuspected tuberculosis in recruits is impossible, and that the criteria used in selecting recruits for radiological examination, particularly "tuberculosis in the family" and "pleurisy" in the past, as these histories are given by the recruit, cannot be relied on to detect more than a small fraction of recruits with either active or healed pulmonary lesions.

I recognise that the number of recruits investigated is too small to permit of formal conclusions, but this note may stimulate others to publish their findings so that sufficient material may be collected for an inquiry into the criteria at present used for choosing the men referred to tuberculosis officers, and into whether criteria do in fact exist which would enable the medical boards to select a large proportion of unsuspected bearers of active tuberculous lesions.

Publication of the incidence of tuberculosis among recruits as discovered by the present method of referring selected recruits to tuberculosis officers would be of great practical interest, and might serve as a potent stimulus to the adoption of routine radiological examination for all recruits.

1. *Brit. med. J.* 1936, **1**, 741.

2. *Lancet*, 1940, **1**, 263.

3. *Brit. med. J.*, 1940, **2**, 245.

4. Since the above was written I have seen a patient at my clinic with very extensive bilateral phthisis and tuberculous laryngitis (he had been hoarse for eight months) who was rejected by the medical board and told to see me (no confirmatory report was apparently considered necessary). He had had a hæmoptysis in 1936, when his doctor had not referred him to the tuberculosis dispensary and had not himself carried out any investigations for tuberculosis. The patient had also attended the same doctor several times for cough, sputum and hoarseness during a period of three months until about four months before seeing me again without being referred to the tuberculosis dispensary or having his chest X rayed or sputum examined.

Reviews of Books

Field Surgery in Total War

By DOUGLAS W. JOLLY, M.B. N.Z., late major, Spanish Republican Army Medical Service. London: Hamish Hamilton, Medical Books. Pp. 236. 10*s.* 6*d.*

COUNTLESS books were written on the surgery of the great war, many about the Spanish war, and not a few have already appeared about the present one. This is as good as the best of them, and exactly suited to the needs of the front-line surgeon. Dr. Jolly's views are based on his work with the Republican Army in Spain, and though both the scale and the duration of the Spanish civil war were less than those of the last European conflagration the fighting was more continuous and more localised, and the experience of the front-line surgeons correspondingly greater. He has the eye to observe and the industry to record all he sees, the ability to reduce his observations and records to clear principles and simple instructions, and an uncommon talent for stating his conclusions briefly and attractively. The first part of his book deals with the disposition of advanced operating hospitals in a war dominated by aerial attack; the second and larger part concerns surgical technique. His instructions on the management of wounds of the head and spine, of the eye and the thorax are particularly valuable. These are injuries in which intelligent management by advanced surgical units at times of stress is of the utmost importance; on that depends the benefit they will derive from the surgery of the specialised hospitals to which they will be drafted at the earliest opportunity. Throughout Dr. Jolly writes with shrewd judgment and a sane practical outlook, and in a lucid and occasionally epigrammatic style. The book should be read at once by every young surgeon who may be called on to treat war casualties, and by every consultant who is still uncertain how far his memories of the last war fit into the actualities of this one.

Diseases of the Esophagus

Diagnosis and Treatment. By PORTER P. VINSON, M.D., D.Sc., F.A.C.P., professor of bronchoscopy, esophagoscopy and gastroscopy, Medical College of Virginia. London: Baillière, Tindall and Cox. Pp. 224. 22*s.*

Professor Vinson is a disciple of the late Dr. Henry S. Plummer, to whose memory he dedicates his book. The string method, associated with the names of Plummer and Vinson, is the central theme round which all forms of treatment of diseases of the œsophagus are grouped, and is described fully. Few details are given of the surgical methods used from time to time, or their results. The string method consists in dilatation of the lumen at the level of the growth by means of bougies passed over a previously swallowed silk thread. He states that more than 90% of his patients are benefited by this treatment, and suggests that if all patients complaining of dysphagia were instructed to swallow a thread at an early stage, gastrostomy would never be required. No details are given about the management of those cases in which it has been impossible to negotiate the stenosis with bougies, though he draws attention to the miserable condition of patients with complete obliteration of the œsophagus and emphasises their willingness to undergo any operation likely to improve their condition. He damns direct surgical intervention with less than faint praise, however, and is almost as pessimistic about radiotherapy and roentgenotherapy; nor is he in favour of gastrostomy, in which his experiences must have been unfortunate because he quotes the mortality as ranging from 10 to 50%. It is curious to English readers to find him referring to the expense of the operation as one of its contra-indications. He stresses the dangers of œsophagoscopy and indicates the many conditions in which it can be dispensed with. Among a series of unusual tumours of the œsophagus he mentions varices and recommends ligation of the larger veins passing up to the œsophagus from the cardiac end of the stomach; but says nothing of the results of this intervention. He points out that a foreign body which has passed from the œsophagus into the stomach may be vomited back, and quotes the case of a safety-pin which lodged with point upwards about the middle of the œsophagus; it was pushed into the stomach at an œsophagoscopic examination and later regurgitated into the upper œsophagus, this time with the blunt end upwards, so that it was easily and safely removed at a second œsophagoscopic examination. From this he argues that it is sometimes better to push a sharp-pointed foreign body into the stomach than to attempt its uncertain removal by the retrograde route.

Though most concerned with the practical side of the subject the book deals shortly with all the pathological charges likely to be met with. There is a full bibliography at the end of each chapter and the illustrations, more particularly the radiograms and diagrams, are clear and well chosen.

Diseases of the Nervous System

By F. M. R. WALSHE, M.D., D.Sc. Lond., F.R.C.P., physician in charge of the neurological department, University College Hospital; and physician to the National Hospital, Queen Square. Edinburgh: E. & S. Livingstone. Pp. 288. 12*s.* 6*d.*

THIS textbook makes the subject of neurology vital and interesting to the general practitioner, for whom it is chiefly intended. The author has maintained in his preface that "the writing of a simple textbook adapted to the needs of the student and practitioner has been the avowed aim of more authors than have achieved it"; and he then defends his omissions and simplifications. The defence is not needed; intended readers will not grumble because the dispute surrounding the spared macula has been passed over in a few words, and the academic sub-groups of the gliomas reduced to two types depending on their rate of invasion. On the contrary, much of the simplification, designed for lucid teaching, has led to a masterly synthesis of material superficially unconnected or incongruous. Thus his description of the symptomatology of cerebellar lesions brings scattered observations into line, and the diverse signs of incoördination have an ordered relationship to each other. It is delightful to read a book where signs and syndromes do not live as separate entities, under cover of classical neologisms or the names of defunct neurologists, but play active parts in the evolution of a descriptive narrative. The symptoms arising from damage to various units of the nervous system—such as the upper and lower motor neurones—are first described and then are remodelled into descriptions of different disease groups. Organised neurophysiology and anatomy have been displaced by such subjects as the symptomatology of the sphincters or of speech, and the story is told in a language which the practitioner will enjoy. In the description of diseases the common conditions, such as epilepsy, vascular diseases, and syphilitic infection have been dealt with carefully and rare and unimportant syndromes excluded. Dr. Walshe is dogmatic, for which he could be criticised by the expert, but he has used his dogmatism so skilfully that it is likely to do more good than harm. The uncompromising view that all traumatic neuroses are motivated by gain, however, will find many dissentients, and might give the general practitioner a cynical outlook in handling a difficult and delicate subject.

Protozoology

(2nd ed.) By RICHARD ROKSABRO KUDO, D.Sc. London: Baillière, Tindall and Cox. Pp. 689. 36*s.*

IN this textbook, a revised and enlarged edition of the author's "Handbook of Protozoology" published in 1931, Professor Kudo of Illinois describes the representative forms of both free-living and parasitic protozoa. The first part of the book deals with morphology, reproduction, physiology, bionomics and genetics. The second part, 37 chapters in all, is taken up by a systematic account of the various subdivisions. Convenient dichotomous keys gradually lead from accounts of the major groups to those of families, which contain short illustrated descriptions of selected genera and species. The book provides an authoritative guide to the study of protozoa for the general zoologist, but does not give any special prominence to the parasitic protozoa of man, which are disposed of in about half a dozen pages; it therefore will not satisfy the needs of the medical man. It will serve, however, as a useful supplement to the more practical publications in medical protozoology, since it gives an insight into problems and data connected both with parasitic and free-living protozoa with which the medical reader is less familiar.

In England Now

A Running Commentary by Peripatetic Correspondents

THE "season of mists and mellow fruitfulness" is marked by the invasion of our wards by hordes of new students. Every year they seem to be younger and more boyish—or girlish, but that may be because I am getting a bit thin on top. I always found the beginning of term a rather grim business. The application of one's nose, already tending to the Churchillian pattern, to the academic grindstone at times to suit the convenience of others always made me sigh for the free-lance opportunities afforded by the vacation.

Perhaps it was with this in mind that the authorities of this Scottish university arranged that our first week of study should be enlivened by a lecture on fire-fighting. If so they must feel that the experiment succeeded beyond their wildest dreams. The audience consisted of about 150 souls, most of them members of the teaching staff and representing all faculties. Not a few of them were members of the senate; and if we adopt the phraseology dear to the popular writers on astronomy we might say that if their academic qualifications were to be placed end to end they would stretch a considerable distance. Our lecturer was an honest fellow but clearly unaccustomed to handling an audience such as this; and as he looked up at the rows of inquiring faces he was observed to break out into a gentle sweat. No doubt he realised in that moment that he was committed to a task beyond him, but he attacked it with native courage. . . . For a moment or two he seemed to waver, but presently he plunged into his discourse in full oratorical style, embellished by a patois that only becomes intelligible after living many years north of the Border. He declared "with some 'eat," as Stanley Holloway might say, that it was not his intention to turn us into firemen; that, he added, amid loud laughter, was impossible. Nevertheless, he gave us a comprehensive account of the pathogenesis of what he called "that terrible thing, that scourge—FIRE."

Not unnaturally, he showed a complete inability to adapt his lecture to the limited requirements of a group of people needing instruction on how to deal with an incendiary bomb; and so he spent the first three-quarters of an hour in dealing exhaustively with the menace of the cigarette-end, the electric smoothing iron, short-circuits in domestic premises and kindred subjects, all of which were richly annotated with personal experiences. Page after page of the notes were turned over; he had set his hand to the plough, and there was no looking back.

After treading figuratively but none the less heavily on the toes of the professor of divinity he turned blithely to illuminate his subject by drawing a comparison between fire-fighting and first-aid. This necessitated a discourse on the practice of surgery, and after the regius professor in this subject had endured it with his head in his hands for upwards of ten minutes he rose with a fixed expression on his face and made his departure. The climax was reached after 1½ hours, when the lecturer, turning to the subject of the fireman's lift, called down a student whose weight was probably in the neighbourhood of 14 stone. Casting his eye over the audience, and ignoring completely a large batch of Fellows of the Royal Society, he summoned an erudite but frail lady, a scientist, to perform the herculean task of shifting this mountain of flesh which had now been deposited on the demonstration table in the well of the theatre. Such was his strength of character that he prevailed upon the lady to crawl along the bench trying, without any visible result excepting a considerable loss of dignity, to drag the prostrate form away from an imaginary fire.

Unveraciously though I have reported it, the lecture had great merit as a variety turn.

* * *

Living in London now is a curiously unreal experience. During the day the recurrent wail of the sirens, the occasional noise of anti-aircraft gun-fire and the constant reminder every few hundred yards or so that these sounds are significant still fail to impress most of us with any sense of living in stirring times. It must be a fact that history is being made under our very noses, and indeed that we are playing some part in the process, but the imagination does not grasp the situation vitally enough to heighten our senses to awareness. Perhaps this is just as well. It would be intolerable to witness in others a theatrical assumption of a share in destiny and probably rather uncomfortable to play the rôle oneself. However, we have now discarded the weather and adopted the bomb as our conversational stand-by. Everybody has his story of his own pet bomb which was so much more peculiarly harmless or devastating than anyone else's. Powers of description and the general standard of eloquence are rising rapidly, and even the most terse narrator is finding it difficult to tell his story without interruption. If a few weeks of the blitzkrieg has so loosened the tongue of the proverbially silent Englishman what are a few months going to do?

Underlying the cheerful exchanges of the daytime is always a slight chill anticipation of the night. On a cloudy day when the airman's visibility resembles that of night we walk the streets and carry on with our jobs almost regardless, and often forgetful, of the alerts and all-clears. But at the approach of dusk the tempo quickens and conversations quickly break up as the homing instinct becomes dominant; and by blackout the streets are deserted. In our homes or shelters darkness completely alters our attitude—the warning and almost simultaneous hum of the raiders are perceived with a stark and sturdy clarity. We are for it and we know it and are quite definite about our determination to stick it out. This contrasting spirit of acceptance of what are apparently similar circumstances is probably an unconscious tribute to our youthful air fighters. We are sublimely sure that the "boys" will find 'em and beat 'em up in daylight however unfavourable the conditions and odds and we don't bother about it any more. But at night there is the primitive fear engendered by darkness, and we feel that the Nazis can at the moment indulge in their major amusement, the infliction of hurt, with little risk to themselves. And we feel resentful, rather disgusted and somewhat cheap at being the objects of such bestial indulgence and at our temporary impotence to prevent it. Presumably this is why there is so little call for reprisals although there is an intensifying desire for vengeance and punishment. For this mass exhibition of sadism arouses in us all, even those with the most highly developed social conscience, emotions of which we would otherwise be ashamed. It is difficult at all times to dispel an emotion by reason, and in this case the recurrent provocation makes it still more difficult. Thoughts endured during the night often disappear with the light of day, but there is now too much visual evidence with which to reinforce these nocturnal ponderings All the same, we shall have to get these mental conflicts into their proper perspective if we are going to discount them when the time comes for a final settlement.

* * *

Sometimes between my waking and my shave I feel the coursing of that dread alkaloid disillusionine. Formed from alcoholic esters by celibacy and autointoxication its action is to draw all kindly screens aside and give a corpselike clarity of view. My cabin becomes a dirty box, eight feet square, badly ventilated. Around me in similar dirty boxes are my shipmates, whose faces I loathe and whose habits I abhor. Some of the more revolting and despicable of these individuals I have to call "Sir." This war business is a reversion to a thirteen-year-old state of affairs and we are all kids again. That is why they dress sailors up in Jean collars, decoratively like children. Incidentally all uniforms are forms of atavism. The Scotch kilt has a perfect homologue in the coloured behinds of the apes; it exerts the same attraction for the opposite sex and has much the same sort of colour scheme. I must remember to tell McSporran that at breakfast—it will annoy him.

If I am allowed to open my scuttle I shall look out on the grey waters of a famous naval harbour, probably one of the safest places in the country, while a few hundred miles away in London women and children are in the front line by day, in dug-outs by night. Some idiots marvel at the cockney courage, yet everybody knows they made the best trench-warfare soldiers; they are inured to murk and noise and miserable conditions as well as the sense of catastrophe ahead, and for generations the struggle for existence has been keener in London than anywhere. Besides, the cockney has a sort of natural taste for horrors. I remember watching the eyes

of some Southwark scouts around a camp fire when one of their number was singing with evident relish, "Red stain on the carpet, red stain on the knife, O Dr. Buck Ruxton, you've murdered your wife" and about twenty more verses. Camp in August, 1939; it seems a century away.

* * *

Living on the south-east coast these days entails interesting ocular and unpleasant auditory impressions, and even periods of cave-dwelling; but all become matters of custom. Everyone, or nearly everyone, adopts willy-nilly something of a fatalistic response and as the blitzkrieg goes on it worries us less and less. Bombs fall on golf-courses, cricket-grounds and gardens, but as yet elderly doctors have their bowling-greens undamaged; there has been considerable damage to property, but few human casualties in the many raids—with one exception. One afternoon a solitary raider dropped a row of bombs which fell on a cinema during a special children's matinée and on streets of small houses over a hundred years old. The cinema was wrecked, many houses were demolished, there was much damage to life and limb. The resources of a nearby hospital and first-aid post were strained to their utmost owing to the number and the concentration of the casualties. The operating-theatres were in full swing for twelve hours, and, after a break of four hours, for a second shift of eleven hours, 72 operations being performed in that time. Among these casualties, running well into three figures, there was one solitary member of the fighting forces: all the remainder were civilians, many of them children. The exception was an aircraftsman, home on four days leave, who had just sat down in the cinema when that bomb exploded.

I had ample opportunity to observe the reaction, immediate and delayed, of the victims of this startling experience. In the cinema there was no panic. Many parents were there with their children and were together or adjacent to each other in the hospital later. In first-aid post, theatres and wards the fortitude of these stricken folk had to be seen to be believed. One woman of 69 lying on a stretcher was insistent that every child must be attended to before she took her turn. She was found to have a compound comminuted fracture of the femur. Another elderly woman who had one eye destroyed and multiple injuries apologised to the ward sister because she had been sick before a bowl could be brought to her. From not one of them was heard a complaint or seen a tear. Most remarkable of all, there were no bitter words, no recrimination. With all this talk of reprisals no thought of revenge appeared to enter their minds. Soon the wards were full of smiling faces, some bandaged but all cheerful. Children proudly exhibited foreign bodies removed from various portions of their anatomy, designating all of them shrapnel. No longer playing at soldiers, they were now real wounded soldiers. There appeared to be no delayed shock; one and all took their injuries as part of the day's work, part of what their country was going through.

Even this painful episode was not without its lighter side. One frantic mother implored the hospital to find her two small sons. They had gone to the cinema, of that she was certain, but there was no trace of them in the hospital or elsewhere. Some hours later they came home safe and sound. Yes, their cinema had been bombed so they had gone on to another one. An elderly man with badly smashed tibia and fibula seemed less concerned about them than about the loss of an overcoat of well-known make; it was not found in the debris of the cinema, but a line from the hospital to the makers produced a new coat along with a generous expression of hope for his speedy recovery. A young woman lost her home; with it, we heard, had gone a favourite nail-file.

* * *

He was sent to us as a case of neurosis, a surly and disgruntled fellow who refused to look you in the face. He had a fine physique but chose to lie curled up in bed until the medical officer had finished his round—he was active enough when the visit was over. It was difficult to make him talk, but at last he responded. "What was your job in civil life?" "Inspector of milestones, sir." I hadn't realised that there was such an occupation, and said so. "Tramp to most people, sir!" Have neurotics a sense of humour? Or was the joke on the diagnostician?

HEALTH INSURANCE IN THE UNITED STATES

REPLY TO A BRITISH RESIDENT[1] BY AN AMERICAN MEDICAL ECONOMIST

THERE is a tendency, which is common to advocates of compulsory sickness insurance in the United States, to give exaggerated credence to the reports of the Committee on the Costs of Medical Care. The opposition of the American Medical Association to compulsory health insurance has not been based on such generalities as calling it "state medicine," or such minor points as that it might give rise to "graft," or even because practitioners are "kept busy filling in forms." Such criticisms could doubtless be found, but the basic opposition was founded on the most thorough study of the medical side of European sickness insurance that has been undertaken by anyone in the United States and certainly a more thorough study than was made by any of the advocates of such insurance. Some of the arguments offered against it were that it had failed to reduce morbidity and mortality as fast as these had been reduced in the United States and in other countries not having such systems of sickness insurance, such as Australia, New Zealand and Canada. The published statements by physicians in countries having sickness insurance concerning the effects of such systems in lowering the quality and quantity of medical care were also quoted. No statement of the American Medical Association has ever implied that there was not "free choice of physicians in the British system," or that any system of sickness insurance was bankrupt. On the latter point, it has been pointed out repeatedly that such insurance systems cannot go bankrupt because the flexible element which can always be adjusted to fit income is the quality and quantity of the medical service.

The Wagner Health Bill was not opposed because it provided federal subsidies for local health services. On the contrary, the state and county medical societies have been the principal advocates of the establishment of public-health services and have coöperated with these in their legitimate field of protection to the public health. Such public-health departments have been criticised only when they have sought to enter the field of private practice. The advances of public health in diphtheria immunisation are very largely due to the active coöperation and the initiative of county medical societies, which are the component units of the American Medical Association. Neither is it by any means true that graft and political influences have not greatly interfered with the efficiency of American public-health administration. There are few city health departments of long standing that have not at some time in their history had political scandals which have called for strong protests on the part of organised medicine. It is no exaggeration to say that whatever freedom from harmful political influence exists is due largely to the watchfulness and activity of organised medicine. The opposition to the Wagner Health Bill, so far as it was related to health insurance, was because of a rather tricky provision in the bill which, without mentioning insurance, was apparently designed to introduce it surreptitiously. Incidentally, the bill was not defeated but is still on the Congressional calendar, but apparently has been abandoned by its former advocates largely, it is believed, because of the arguments offered by the American Medical Association. Furthermore, the association has offered a programme regarding medical service and health protection which seems to be gaining favour and some of which has already been enacted into law.

While it is true that voluntary health insurance does not "solve the problem of providing medical attention for the poorer members of the community," it is equally true that compulsory health insurance in no country covers the indigent but only the wage-earners. On the other hand, the state and county medical societies in the United States have been the foremost agency in organising, in coöperation with the relief authorities and often at great financial sacrifice to the physicians concerned, the extensive plans in existence for "providing medical attention for the poorer members of the community."

1. *Lancet*, 1940, **2**, 207.

THE LANCET

LONDON: SATURDAY, OCTOBER 26, 1940

SUPERIORITY OF WHOLEMEAL

THE inferiority of white flour in vitamin-B_1 content is generally accepted, but its inferiority in other respects, particularly in its content of vitamins of the B_2 complex, is not so widely conceded. In an experiment described on another page Dr. HARRIETTE CHICK has demonstrated this inferiority so clearly and simply that no-one can gainsay it. Dr. CHICK has fed groups of rats on white flour (73% extraction) and wholemeal (100% extraction) derived from the same grist. All the rats received diets between eight and nine tenths of which was made up of one or other of these two flours, the rest of the diet consisting of added protein, minerals and fat-soluble vitamins. Vitamin B_1 was added to the white-flour diet so that the rats received 3 international units per head daily; this is an optimum dose of vitamin B_1 for a rat, so that any inferiority which might be shown by the rats receiving white flour could not be attributed to lack of vitamin B_1. The rats receiving the wholemeal derived from it their vitamin B_1 and any other vitamins of the B_2 complex which might be present; any superiority which they might show over the rats receiving the white flour must be attributed to their greater intake of vitamins of the B_2 complex or possibly to the presence of some other unknown factor. The rate of weight-increase of the rats receiving wholemeal was almost exactly twice that of the rats receiving white flour with added vitamin B_1, and when after two weeks the diets of the two groups were exchanged the performances were similarly exchanged. The graph of the weights reproduces that of HOPKINS[1] for the classical experiment in which he demonstrated the action of vitamins in milk. Further analysis of Dr. CHICK'S results would seem to show that not only did the wholemeal promote weight increase more rapidly than the white flour despite the fact that the white flour was better digested and presumably better assimilated, but it also promoted it more economically. In order to gain a gramme in weight the rats needed less wholemeal than white flour. The experiment does not show what is the defect in white flour which diminishes growth and appetite; the author indicates that this is being sought. One or other of the known constituents of the water-soluble vitamins other than vitamin B_1 is suspected.

Some will still doubt whether a diet which promotes growth in a young animal will necessarily promote the well-being of an adult, who is no longer concerned with growth but with doing a day's work. The answer must be that in nutrition work growth is merely used as an index to show whether the animal is in a state of well-being and adequately nourished, rather in the way that the temperature is used in clinical medicine. The same vitamins are needed for growth promotion in the young as for maintenance in the adult. The young and the adult need all the same nutritional elements, except that the young need relatively more of them. Adults have to balance the continuous process of gain and loss of nutritional elements within their tissues; the young have to do the same but in addition to put down new tissues. We may safely conclude, then, that if one diet does not enable the young to grow and another does the second is also more nourishing for the adult than the first. And, if we accept that these findings in rats are applicable to man, we may argue that the signpost points to wholemeal as the high-road to better health and greater food economy, more particularly for the growing child but also for men and women. Political or economic considerations may make it impossible to take this road in wartime, but the general conclusion from the nutritional standpoint is not thereby affected.

1. Hopkins, F. G. *J. Physiol.* 1912, **44**, 433; reproduced in *Spec. Rep. Ser. med. Res. Coun., Lond.* No. 167, p. 17.

PHYSIOLOGY OF SLEEP

No physiological theory of sleep is sufficiently well established to explain sleeplessness or to suggest convincingly how to overcome it. This is not because the theories are vague, but because no single one is able to explain away the facts which support its rivals. PAVLOV'S dog, conditioned to salivate a certain time after a stimulus, is first faced with the task of not salivating immediately after. PAVLOV devised many ways of making dogs exert their powers of inhibition, and since conditioned reflexes are accepted as a function of the cortex such inhibition was also regarded as cortical in origin. The fact, probably quite unexpected, that dogs fall asleep if the inhibitory effort is intense appears almost as a divine revelation of the cause of sleep. Yet HESS has demonstrated quite convincingly that cats with electrodes embedded in the hypothalamus will fall asleep when this part of the brain is stimulated, and wake up and behave naturally later. It is hard to make a theory of sleep which does no injustice to either of these convincing demonstrations. Chemical theories are based on evidence, not very satisfactorily confirmed, that cerebrospinal fluid transferred from a dog which has been kept awake to one which is fresh will put the fresh dog to sleep. The action of benzedrine, which is well known to produce wakefulness, forbids us to treat chemical theories too lightly. While it has been claimed that the nerve-cells of a dog killed after a very long period without sleep exhibit degenerative changes, observations on living men and animals after a single long period of sleeplessness fail in general to show any deleterious effect on various kinds of performance test. The only positive effect seems, in fact, to be that it is difficult to keep the subjects awake. The thresholds of sensation are, however, raised and proprioceptive impulses from the muscles probably fewer. KLEITMAN believes that cortical inactivity, due to a paucity of incoming stimuli, is the most important factor initiating sleep.

The secret possibly lies in some connexion between the hypothalamus and cortex. Pathological lesions and experimental manipulation alike show beyond doubt that interference with the posterior hypothalamus tends to produce a condition of drowsiness. CANNON believes that in this, the headquarters of the autonomic system, dominance of the parasympathetic element periodically occurs and produces sleep and general restoration of the body. It is now a

commonplace that the cortex can influence the autonomic system, and it may be that the hypothalamus can interfere in some way with the function of the cortex—perhaps with its reception of impulses. It is, perhaps, simpler to accept a periodic fluctuation in cortical activity which matches the hypothalamic rhythm. The electricel activity of the cortex changes during sleep, and it is common experience that the exclusion of sensory stimuli and the relaxation of voluntary muscle predispose to sleep. Whether physical fatigue acts by means of chemical metabolites influencing the sleep mechanism, or simply by promoting relaxation and reducing afferent impulses, it is impossible to say; both might play a part. In assessing the importance of a chemical action—such as that of a drug—it must be remembered that with most people going to bed is a ritual, and that habit must strongly reinforce the other influences inducing sleep. A drug, therefore, which does not act on the central sleep mechanism might be efficacious by reducing an unduly excited person to a more insensitive condition at the time of going to bed.

Objective criteria—such as the strength of stimulus required to raise the blood-pressure of a sleeper—agree in showing that sleep becomes very deep in the first two hours, less deep in the next two or three, and thereafter becomes progressively lighter until waking occurs. Authorities differ regarding the importance of the last few hours of light sleep. It is difficult to find a standard by which to measure the degree to which sleep has been beneficial. Normal individuals probably need have little fear of lack of sleep, provided that six hours or so can be set aside for it. Lack of sleep, unless due to causes which absolutely prohibit it, is likely to cure itself, though the irregularity may be far from pleasant. It is notorious that people sleep more than they think they do, and that insomnia should be judged by its results rather than by the overnight subjective experiences of the victim. The story of the man who said "I dreamed I had been lying awake all night" is not entirely fanciful.

VENOUS LIGATURE AND PARTIAL ARTERIECTOMY

IN the last war MAKINS, TUFFIER and others established as a fundamental principle of vascular surgery that when an artery is tied the companion vein must be tied as well. Ligature of both vessels has the effect of retaining the limited amount of blood supplied by the collateral circulation in the part for a longer period. LERICHE and WERQUIN [1] maintain that ligature of an artery sets up vasoconstrictor reflexes in the vessel distal to the ligature; and that these can be so severe that the collateral circulation is obliterated and may not be restored in time to preserve the limb. They advise, instead of simple ligature, resection of part of the artery so as to interrupt the vasoconstrictor pathways. We lately noted [2] that BERARD and DARGENT were alive to the importance of vasoconstrictor reflexes in carotid ligature and had suggested the use of arteriectomy and venous ligature; SILVERSTONE and WATSON have also recorded better results with excision than with simple ligature of the carotid.

1. Leriche, R. and Werquin, M. G. *Lancet*, Sept. 1940, p. 296.
2. *Ibid*, Sept. 14, 1940, p. 334.

So impressed was LERICHE with the results of partial arteriectomy in the extremities that he went so far as to suggest its use in coronary disease. FAUTEUX [3] has now made some experiments in dogs to show the effect of (*a*) partial coronary resection and (*b*) partial coronary resection combined with ligation of the accompanying vein. He found that resection of 1·5 cm. of the descending branch near its origin was with one exception fatal, owing to the onset of ventricular fibrillation. This result was similar to that following ligation of the descending branch at the same level. But when partial resection was carried out, either at the same time as ligation of the vena magna cordis or a year afterwards, all dogs (apart from those dying of operative complications and intercurrent disease) remained healthy for over a year. Thus the result of ligation of the coronary vein confirms the general principle, and suggests its application as a preventive against a second attack of coronary thrombosis and in the treatment of angina pectoris. The fatal effect of coronary arteriectomy does not invalidate LERICHE'S postulate, because the heart, being liable to ventricular fibrillation, presents a different problem from a limb. Further experiments are in progress to decide whether the diseased coronary artery, no longer a blood-carrier, may act as a foreign body and disturb the coronary circulation by initiating vasospastic reflexes. FAUTEUX hints that a procedure which was fatal in normal dogs might yet benefit patients with coronary disease. GROSS [4] had previously reported attempts to increase the blood-supply to the dog's heart by ligating the coronary sinus. FAUTEUX repeated these experiments, using either ligation or partial obliteration by escharotic injections. He confirmed the mortality which attends ligation, and found escharotics undesirable owing to the necrosis which they sometimes produce. GREGG and DEWALD [5] have studied the immediate effects of occlusion of the coronary sinus on the coronary circulation, and have demonstrated that peripheral backflow is much increased in the descending branch, the blood containing only 3–4 volumes % of oxygen. These results indicate that occlusion of the coronary sinus is at too high a level, and that ligation of the vena magna is more likely to prove the method of choice for encouraging the blood-supply to a potentially infarcted area.

In both coronary and peripheral vascular disease infiltration or section of the regional sympathetic plexus has been used, on the afferent side to relieve pain and on the efferent to abolish vasospasm. The use of permanently destructive agents like alcohol for paravertebral nerve-block may be dangerous; the procedure can hardly fail to interrrupt postganglionic efferent fibres as well, but it is a maxim of sympathetic surgery—proved in the treatment of Raynaud's disease—that interventions on the efferent side must be preganglionic for fear of sensitising the peripheral nerve-endings. It is possible, therefore, that the injection of alcohol into the upper dorsal ganglia for angina may end by aggravating the condition, an effect which might be avoided by the use of a less permanent agent like Procaine.

3. Fauteux, M. *Surg. Gynec. Obstet.* August, 1940, p. 151.
4. Gross, L., Blum, L. and Silverman, G. *J. exp. Med.* 1937, **65**, 91.
5. Gregg, D. E. and Dewald, D. *Proc. Soc. exp. Biol., N.Y.* 1938, **39**, 202.

TREATMENT OF BACTERIAL ENDOCARDITIS

WHEN he first comes face to face with subacute bacterial endocarditis, especially if his patient is young and not yet worn down by the disease, the keen house-physician usually asks permission to try some form of intravenous "antiseptic"; his chief is sceptical, but agrees; in due course the patient dies. The explanation given for the failure of these remedies is that the streptococci, ensconced in platelet-fibrin vegetations on the heart valves, are beyond reach of the drug, or, more significantly, beyond reach of the leucocytes; the main blood-stream whirls the white cells past the valve so fast that they cannot settle, and the avascularity of the cusp prevents their access to the base of the vegetation. Yet after death many vegetations show some degree of healing by fibrosis at their bases, and there are on record rare examples of apparently complete healing. Fatal though the disease usually is, it is not a priori hopeless; it should not take much to sway in the patient's favour the battle between the bacteria and the processes of defence. The ingenious idea of combining sulphanilamide or sulphapyridine treatment with continuous heparinisation has therefore been discussed with interest in the last two or three years. Since BEST and his colleagues in Toronto have made purified heparin available it can be given intravenously to man in amounts large enough to prolong the clotting time of the blood very greatly and probably to check for the time being the deposition of fresh clot on endocarditic vegetations. This might give the drug and the natural defences an opportunity to get the upper hand.

Last year KELSON and PAUL WHITE[1] reported seven cases in which this attempt was made. In two it was early abandoned because of reactions to a toxic batch of heparin. In a third recurrent pulmonary infarction led to the treatment being stopped. A fourth died during the procedure with occipital and subdural hæmatomas. The remaining three received heparin continuously by vein for a week, before, during and after which they took 4–6 g. of sulphapyridine daily. In all three the fever abated and previously positive blood-cultures became negative; one still had congestive heart failure, attributed to rheumatic carditis, 19 weeks later, one was apparently recovered and at work 18 weeks later, and the third remained well for at least 4 weeks. This was no more than moderately encouraging. At the same time FRIEDMAN, HAMBURGER, and KATZ[2] reported one case treated with heparinsation only in which the patient died after 10 days from cerebral hæmorrhage. More recently WITTS[3] had a similar experience. On another page Dr. C. M. FLETCHER describes his efforts with a further case. He was balked at first by a batch of heparin which had much less than its alleged anticoagulant value in man; this he attributed partly to varying methods of standardisation among different manufacturers, partly to varying susceptibility among the bloods of different human subjects. Eventually, however, finding a heparin that prolonged the clotting time of his patient's blood to 3½ times its normal value, he gave 10,000 rising to 50,000 units of it every day by continuous intravenous drip to a patient with *Streptococcus viridans* endocarditis, who received also 4 g. of sulphapyridine daily. On the fourth day the patient woke with headache and vomiting, and died in two hours of multiple cerebral hæmorrhage, verified post mortem. This appears to be the major danger of heparinisation in this disease.

There is little as yet, then, to justify any widespread use of heparin and sulphapyridine in bacterial endocarditis, and no doctor need have it on his conscience if either expense or risk deter him from instituting this treatment. It were well that a few more trials should be made, perhaps as FLETCHER suggests on cases whose streptococci are susceptible in vitro to sulphapyridine, and they should be reported even if they are unsuccessful. But on present evidence there seems to be more hope in further chemotherapeutic developments than in the adjunction of heparin.

1. Kelson, S. R. and White, P. D. *J. Amer. med. Ass.* 1939, **113**, 1700.
2. Friedman, M., Hamburger, W. W. and Katz, L. N. *Ibid*, p. 1702.
3. Witts, L. J. *Brit. med. J.* 1940, **1**, 484.

MORE HOSPITAL GROUPING

THE regionalisation of hospital services was carried a step further at a meeting held at Bristol on Oct. 11. A conference of representatives of municipal authorities, voluntary hospitals and medical organisations in the city of Bristol, over which the Lord Mayor of Bristol presided, resolved that a drafting committee should be appointed to prepare a constitution for a divisional hospitals council in Bristol and for considering the formation, in collaboration with other divisional councils, of a Bristol and Western regional hospitals council in association with the Nuffield Provincial Hospitals Trust. The conference was addressed by Mr. W. M. Goodenough, chairman of the Nuffield trustees, and by Sir Farquhar Buzzard, chairman of the trust's medical advisory council. Sir Farquhar stressed the importance of thinking in terms of medical services rather than individual institutions. The divisional council, through the active coöperation of the municipal authorities, the voluntary hospitals and the university, could provide a unified medical service in the division. Bristol should be the centre of a region composed of several divisions.

DOCTORS' CHILDREN SENT OVERSEAS

THE Children's Overseas Reception Board has suspended its work for the winter, but children can still be sent privately to the Dominions and the United States. Members of the British Medical Association in Australia have offered to receive a large number of doctors' children between the ages of 5 and 16 and a smaller number accompanied by mothers. Members of the New Zealand branch of the association have offered to look after 68 Protestant children (34 boys and 34 girls) and 3 Roman Catholics (2 boys and 1 girl). Mothers are not included in this invitation. Doctors in Canada previously offered to take 1100 children sent under the Government scheme. The Canadian Medical Association now says that unaccompanied children sent privately will be received in medical homes in Canada, and that the Canadian Government will be responsible for their welfare. Finally, the American committee for the evacuation of children is prepared to receive applications from doctors wishing to send unaccompanied children between the ages of 5 and 16 to the United States. Inquiries should be addressed to the secretary of the British Medical Association.

Annotations

KNIGHTS HOSPITALLERS

SOME time in the eleventh century a band of Italian merchants obtained from the Caliph of Egypt permission to build a hospital in Jerusalem for the care of pilgrims. They called themselves the Poor Brethren of the Hospital of Saint John, and their order quickly spread to include knights of almost every country in Europe. They were vowed to the twofold task of fighting against the Turks, and of tending those whom they charmingly termed "our lords the sick" irrespective of creed or race. The second of these duties they have performed unremittingly up to the present day. In his well-documented and beautifully illustrated book[1] Colonel Erskine Hume, himself a knight of the order, has traced its history through nine stormy centuries. The knights were driven from their original foundation in Jerusalem to one island after another, but whether at Cyprus, Rhodes, or Malta, they never failed to establish their hospital, the "Palace of the Sick." Colonel Erskine Hume gives in full the regulations for the great hospital at Valetta in the sixteenth century. Although its patients fed off silver and were nursed by knights of sixteen quarterings the administration was essentially similar to that of a great modern hospital. There were elaborate arrangements for the reception and care of patients—including the somewhat depressing rule that they should make their wills forthwith—there was an outpatient department, a dispensary, a resident medical staff and daily rounds by the physicians and surgeons, as well as a sort of district-nursing service among the poor of the island. By one curious regulation two years service as prior of the hospital was equivalent to an expedition against the Turks. In many respects the knights were far ahead of their time, as in the separation of the different types of disease, and in their insistence on the study of anatomy and dissection, at a time when this was accounted almost criminal in the rest of Europe.

The later work of the order is well known. After they had lost their headquarters in Malta the knights continued, and continue, the work in their separate countries, under one grand master, at present Prince Chigi-Albani. Colonel Erskine Hume gives us many interesting details of their modern activities, and it is refreshing in these times to encounter an international foundation with such a record, which has weathered the storms of nine centuries and still shows no sign of decay.

SPREAD OF PARADOXICAL METASTASES

OUR knowledge of the spread of cancer is still incomplete, as the appearance of the so-called "paradoxical" metastases in the skull, vertebral column, and limb girdles remind us. Dr. O. V. Batson,[2] not satisfied with the suggested methods of spread by nerve sheaths or lymph vessels, has carried out experiments to discover another route, and finds that the vertebral veins appear to be implicated. The dorsal vein of the penis in an adult cadaver was injected with Weber's vermilion, which is radiopaque and readily followed in the tissues under the fluoroscope; 20 c.cm. was injected without resistance, the material spreading readily out in the veins in and about the sacrum. The veins of the ilium and lower lumbar spine also became injected, but surprisingly, none of the material reached the inferior vena cava. As the injection material was increased it was seen to progress up the spine through successive segmental regions until 200 c.cm. had been used, by which time it had reached the base of the skull and entered the cranial cavity. It had also penetrated to the venæ vasorum of the femoral vessels, thus giving a composite picture of the metastatic pattern of advanced cases of carcinomatosis with primary origin in the prostate. Repeated experiments have shown that this course of spread was not accidental. The vertebral system of veins has a rich anastomosis at each spinal segment with the veins of the thorax and abdomen; moreover it is a system almost without valves, in which the pressure is very low. It seemed likely that when, as in lifting and coughing, pressure in the abdomen and thorax was raised, blood would flow not into the inferior vena cava but into the vertebral system of veins. To simulate an increase of intra-abdominal pressure, such as occurs in coughing, a towel was tied round the abdomen of an anæsthetised monkey, and an injection made into the dorsal vein of the penis, colloidal thorium dioxide being used instead of vermilion. Here, in the living animal, the flow was similar to that in the human cadaver and again demonstrated the pattern of carcinoma spread from the prostate.

The vertebral veins are thin-walled and have considerable volume but are difficult to identify when empty. They are storage lakes where stagnation is frequent, and have many connexions with veins of the body cavities at each intervertebral space. They also communicate with the veins of the body wall, including those of the breast, and with the azygos system of veins. Injections into breast venules seemed to follow the pattern of breast-cancer spread—i.e., into the spine, ribs, shoulder-girdle, and skull. It seems possible that tumour and abscess material from many regions may be squeezed, by straining or by coughing, into the vertebral system without involving the portal, caval, or pulmonary system, and this would explain why the lungs are not involved, a constant stumbling block to current theories. The disasters following perirenal injections of air for purposes of diagnosis and the cases of blindness after pneumothorax are certainly due, Dr. Batson thinks, to air embolism in the vertebral venous system.

1. Medical Work of the Knights Hospitallers of St. John of Jerusalem, by Edgar Erskine Hume, Lieut.-Colonel Medical Corps, United States Army: Knight of Honour and Devotion of the Sovereign Military Order of Malta. Baltimore: The Johns Hopkins Press. Pp. 371. $3.
2. *Ann. Surg.* July, 1940, p. 138.

ASPIRIN AS A GARGLE

THE value of antiseptic gargles has always been more or less suspect. Prof. David Campbell in his "Handbook of Therapeutics" says bluntly: "Gargles are really of very little use in throat affections, as they do not reach beyond the anterior pillars of the fauces." Some grant that they are often soothing to the patient, but say that to be of any value they must be hot, when they act merely as fomentations; what the hot water contains is of little moment so long as it is harmless. Still others back their own fancy mixture of phenol and bicarbonate, or what you will. Lately the curious practice of employing powdered aspirin stirred in lukewarm water as a gargle has been gaining in popularity. It is true that aspirin in solution has an antiseptic power about equal to that of phenol, but since acetylsalicylic acid is non-volatile and is soluble only to the extent of 1 in 300 in cold water, though it is more so in warm water and possibly in saliva, there seems to be little to recommend it as an antiseptic in a gargle. The aspirin gargle is esteemed also as a local analgesic in sore throat and after tonsillectomy, but the relief of pain may be partly due to the central action of the drug after absorption, for the instructions are explicit that the aspirin should eventually be swallowed. A totally unexpected incrimination of aspirin when used in this manner comes from a chemical study by Dott,[1] who has investigated the effects of aspirin solutions on the teeth. His brief paper demonstrates beyond doubt that appreciable quantities of the calcium of the teeth go into solution when an aspirin gargle is used. Dott's analyses, confirmed substantially by the independent observations of Dr. J. C. Thompson of the clinical laboratories of the Edinburgh Royal Infirmary, suggest that aspirin used as a

1. Dott, D. B. *Edin. med. J.* October, 1940, p. 700.

gargle over a number of years might well result in permanent damage to the teeth. The faintly alkaline solution of sodium salicylate obtained by dissolving equal weights of aspirin and sodium bicarbonate has no appreciable effect on the teeth, and the same presumably applies to calcium, lithium and magnesium aspirins.

ÆTIOLOGY OF ACTINOMYCOSIS

IT used to be taught—and the belief is not quite dead—that actinomycosis was caused by a streptothrix carried in from the soil on ears of oats and wheat or ends of straw, but when it was shown that the pathogenic actinomyces requires anaerobic conditions and body heat for its maintenance this view had to be abandoned. The frequency of the clinical condition among the farming community suggested that infection was transferred from cattle or pigs to man, but the occurrence of infection where there has been no such association and the demonstration by Erikson [1] that the human strains have cultural differences from the animal strains indicated that domestic animals were certainly not the only sources of the pathogenic actinomyces. Sullivan and Goldsworthy [2] have lately published the results of a bacteriological investigation of 100 periodontal pockets and 24 carious teeth; from these sources they isolated 6 strains of micro-aerophilic actinomyces which were identical in their cultural and fermentation reactions with those of 5 strains recovered from actinomycotic lesions. They thus confirm earlier work that the *Actinomyces israeli* (the name suggested by Erikson for the human strain) is present in the mouth as a normal saprophyte, but ready to initiate infection when the oral mucous membranes have suffered any trauma. This is doubtless the reason for the not infrequent occurrence of actinomycosis after teeth extractions—e.g., impacted wisdom teeth—and probably explains some at least of the cases associated with ears of wheat and the like which may lacerate the mucous membrane. The case for an animal origin of some of the human lesions must be regarded as still not proven.

DENTURES AND INDENTURES

UNTIL the eighteenth century the dentist made dentures with his own hands and it was only when he wanted to use sheet gold that he called in a craftsman to help him. During the nineteenth century the development of accurate casting, vulcanising, the use of impression materials and of porcelain teeth increased the demands on the dentist's time and led him to employ a mechanic, who carried out work-room processes while the dentist was engaged directly with the patient. A highly skilled body of dental mechanics appeared in response to this need, men with a wide knowledge of metallurgical processes. But of late years mere repetition work in mechanical dentistry has abolished the demand for craftsmen, and where his predecessor served a long and necessary term of apprenticeship the dental mechanic of today is often inadequately trained even in the simple processes required of him. This situation led the three dental associations in 1938 to set up, with the cognisance of the Ministry of Labour, a committee under the chairmanship of Mr. R. E. HeegaardWarner, L.D.S., to inquire into the training, conditions of service and wages of dental mechanics.

In their report [3] they examine practices which have contributed to the present situation. They trace weakness in the training of mechanics to the decline of the apprenticeship system. The dentist himself studies the mechanics of his profession as part of his training: indeed, he puts in nearly two years work on this aspect of dentistry but when he goes into practice it is more economic for him to employ a mechanic or, if he cannot afford that, to make use of the services of the laboratory of an owner mechanic and his staff of juniors. These laboratories tend to specialise, so that mechanics working in them get no general training and very little individual tuition, especially in new or costly processes where bungling might mean the loss of expensive material. In contrast, teaching schools like the Borough Polytechnic and the hospitals give the student mechanic good training; but dental laboratories are costly to equip and the numbers attending classes are relatively small, so that few education authorities are willing to establish training schools.

The committee recommend that candidates should be selected for training after a trial period of three months, and then apprenticed by indenture for a term of not less than five years. They do not recommend that employers should charge a premium. The indenture, they consider, should require the apprentice to attend, at some stage, a technical school for additional instruction in dental mechanics and related subjects. Where temporary juvenile labour must be used by a master mechanic, the boy should be warned of the lack of prospects and not engaged for more than three years. The committee believe that if the apprenticeship system were restored dentists would seek the services of mechanics who had taken out indentures and undergone a recognised period of training; a training-school certificate would be additional evidence of skill. They consider that a trained mechanic should receive a wage of not less than £3 10s. for a forty-four hour week.

CONTROL OF MALARIA IN MALAYA

OF forty-one species and subspecies of *Anopheles* recognised in Malaya, only five are malaria carriers. Their control, however, is a major problem which was discussed during the sixth international course in malariology at the Institute of Medical Research, Kuala Lumpur,[1] in 1939. The five offenders have distinctive breeding characteristics which are a guide to control. *A. maculatus* breeds in the sunlit-streams and seepage of rubber estates in hilly land. Suitable breeding places have been unintentionally created by the extensive replanting programme begun in 1936; old rubber trees were removed leaving holes in the ground and terraces were constructed on hilly lands for contour planting, in order to minimise soil erosion. Other vectors are *A. umbrosus* and *novumbrosus* which are shade breeders with a predilection for jungle swamps; *A. sundaicus* is an addict of brackish water and *A. barbirostris* a pool breeder in overgrown borrow pits and mining holes. In devising a system of antimalarial organisation the area to be protected must be defined; the breeding places of anopheline vectors within it must be ascertained and a system of weekly records of antimalaria work kept. The anopheline vectors have an effective range of about half a mile, but unfortunately, as observations made in 1937 and 1938 by Dr. W. E. Holmes show, under the conditions brought about by replanting *A. maculatus* can cover about three times that distance in sufficient numbers to cause a serious outbreak of malaria. The area must be mapped with a primary circle of a radius of half a mile, the centre being the labourers' lines; secondary circles are then taken from staff bungalows, so that the intervening ravines can be adequately supervised. All streams, seepages and pools within the defined area are examined for anopheles larvæ, and if the survey is made between early March and June, the most active breeding season of *A. maculatus*, it will afford a reliable idea of the malaria potentialities of the area. One valuable measure is to drain the subsoil by placing all visible water in pipes underground; this can be reinforced by open earth drains and the use of larvicides, such as prepared oil mixtures or Paris green. Control of urban malaria requires special measures, being

1. *Spec. Rep. Ser. med. Res. Coun. Lond.* 1940, No. 240.
2. Sullivan, H. R. and Goldsworthy, M. E. *J. Path. Bact.* September, 1940, p. 253.
3. To be had for 1s. 6d. from 13, Hill Street, London, W.1.

1. Howard, S. C., Holmes, W. E. and Wilson, T., *Bull. Inst. med. Res, F.M.S.* 1939, No. 2.

bound up with legal rights or ownership. Suitable by-laws have been formed to enable the local authority, after due notice, to enter on dangerous land and carry out any works deemed necessary for preventing the breeding of mosquitoes. It is nearly always to the financial advantage of the owner to have the work carried out by the local authority. In order to minimise the breeding of anopheles in cattle hoof-marks, cattle sheds are forbidden within the town limits unless specially licenced; by-laws exist to prevent the grazing and straying of cattle on lands where their presence is likely to favour the propagation of mosquitoes. Breeding in lakes is controlled by clearing and oiling the edges and by the suppression of water-weeds which give cover to mosquito larvæ. This has been successfully achieved by stocking the lakes with weed-eating and larvæ-eating fish. Fish ponds used by Chinese squatters to breed edible fish require control to prevent the propagation of *A. barbirostris and A. sinensis*. Rivers have to be canalised. Passive infiltration by dangerous mosquitoes which are introduced by trains and other vehicles is best controlled by hand-catching.

Dr. T. Wilson, health officer of Lower Perak, has paid special attention to suppression of malaria in Malayan "*kampongs*," or village communities, where education and propaganda are useful. In many rural areas the treatment of active cases may be the only practical method of control, but it does little to reduce the spread of the disease. The possibility of success with drug prophylaxis depends on local conditions. In Malaya the population is scattered and there is no definite malaria season. Administration of drugs must be continuous and is relatively so costly that it is unpractical.

COLD PRESSOR TEST IN PREGNANCY

SOME say that in the ætiology of hypertension there is a constitutional factor, which may be either an oversensitive vasomotor centre or an abnormal reactor mechanism. On this view Hines and Brown [1] devised a standard test for measuring the variability of blood-pressure, the response to which might be an index of a pre-hypertensive condition. The technique of the test is simple. After a rest in the recumbent position for not less than a quarter of an hour the basal systolic blood-pressure is recorded, and then, with the sphygmomanometer cuff still in readiness on one arm, the other hand is placed in ice water at 4–5° C. Blood-pressure readings are taken after 30 sec. and 60 sec., when the hand is withdrawn from the ice water. Readings are then taken at every two minutes until the basal level is again reached. Three points in response are considered important. First, the range of response, which is the difference between the basal level and the highest level recorded after the hand is placed in the bath; the normal here is in the region of 20 mm. of mercury. Secondly, the peak or highest recorded reading, the normal of which is placed at 145 mm. Hg. Thirdly, the time taken to return to normal after removal of the hand from the bath; this should not exceed two minutes. Hypertension ordinarily takes many years to become established, but in pregnancy complicated by a pre-eclamptic toxæmia years are contracted into months and even weeks, so that an abnormally high reading for the cold pressor test might reasonably point a warning finger at those women who are destined to become toxæmic. Professor Browne,[2] whose writings have done so much to draw attention to the early diagnosis and timely prophylaxis of pregnancy toxæmia, has carried out the cold pressor test with slight modifications on 75 primigravidæ, in 52 of whom he was able to appraise its value. He regards a peak reading of 130 mm. Hg as suspicious, a lower figure than Hines and Brown. In 23 of his patients the peak reached or exceeded this figure and in 12 of these pre-eclamptic toxæmia resulted; 9 of the 23 had a reading of 140 mm. or over and 6 developed toxæmia, while of 5 whose peak was 150 mm. or over 4 developed toxæmia. Of the remaining 29 patients in whom the peak was below 130 mm. only 11 developed toxæmia. He concluded that the higher the peak the more likely the development of subsequent toxæmia. The peak, however, is partly determined by the range, and it follows that a high basal blood-pressure, even though the range is normal, may indicate that toxæmia will follow later; in his series the mean basal systolic pressure was 108 mm. Hg among patients who remained normal, and 116 mm. Hg among those who developed toxæmia later—a significant difference. He concludes that a high basal pressure is therefore valuable as a pointer. He is unable to show that a high range or a prolonged time—i.e., over two minutes—in the return to normal is of any significance in picking out likely candidates for toxæmia. The test thus seems to tell us little more than an accurate straightforward blood-pressure, while it has the disadvantages of expending time and upsetting the patients, who are notoriously susceptible to even trivial scientific investigations (two of Professor Browne's patients fainted during the test). There seems then to be no valid reason for adopting the cold pressor test in antenatal clinics in place of the well-established ordinary blood-pressure readings.

1. Hines, E. A. Jr. and Brown, G. E. *Ann. intern. Med.* 1933, **7**, 209.
2. Browne, F. J. *J. Obstet. Gynæc.* August, 1940, p. 365.

HISTOLOGICAL EFFECTS OF THOROTRAST

FURTHER observations on the local histological effects produced in rabbits by the intraperitoneal injection of thorotrast have been made by Efskind [1] at the Rikshospital, Oslo. He found that most of the substance was deposited in the omentum, mesentery, diaphragm and tendinous aponeuroses of the anterior abdominal wall. It persisted in these sites for the whole of the six-months period of observation. Degenerative changes in the nuclei of the endothelium were found in the eighth week after injection accompanied by appearances interpreted as amitosis and pseudoamitosis resulting in the formation of giant cells. The latter, however, did not persist or give rise to further cell forms. The histological picture resembled that obtained at an earlier stage after roentgen irradiation of the peritoneum. Proliferation of the peritoneal connective tissues was observed in the later stages accompanied by multiplication of blood-vessels and lymph-vessels. The new tissue so formed sometimes gave rise to papillomatous formations which were chiefly found on the abdominal wall and diaphragm, seldom on the omentum. In other experiments Efskind preceded the injections of thorotrast either with injections of various irritants, such as bacteria or vital dyes, or with roentgen irradiation, but these measures did not alter the specific effects caused by the thorotrast. In his experiments no malignant tumours were produced, but it may well be that the period of observation was not long enough. In Foulds's [2] experiments on guineapigs 2½–3 years elapsed before the appearance of sarcoma and carcinoma, while the corresponding period in Selbie's [3] experiments on rats was 11 months. There is, moreover, some evidence that the susceptibility of different species to carcinoma formation varies, rabbits and mice being more resistant than rats. The susceptibility of man is unknown but the crucial period for the earlier recipients of injections is probably at hand.

1. Efskind L. *Acta chir. Scand.* 1940, **84**, 79.
2. See *Lancet*, 1938, **2**, 1548.
3. Selbie, F. R. *Ibid*, 1936, **2**, 847.

Prof. THOMAS SINCLAIR who has represented Queen's University, Belfast, in Parliament for almost twenty years has retired on grounds of health..

The third list of subscriptions to the Medical War Relief Fund brings the total amount contributed to £6616.

Parliament

THE House of Commons spent Oct. 17 in surveying national health policy as it is affected by war-time conditions. Mr. R. J. DAVIES called for an extension of National Health Insurance, particularly to meet the conditions created by war. Millions of troops in this country, he said, were provided with excellent medical attention but a large section of the civilian population were not. Medical attention should be extended to the whole of the wage-earning classes—some 40,000,000 of the population.

Minister of Health takes Stock

Mr. MALCOLM MACDONALD agreed that the health of the people was as important as the need to pile up a powerful armament. If the people were unhealthy the production of war implements would flag and halt. But the good health of the nation was on the march. The number of children in England and Wales who died before their first birthday in 1939 was 50 per thousand born—the lowest figure ever recorded, 3 per thousand less than the figure for 1938, and less than half that for 1914. In 1939 the number of women who died in childbirth for each thousand total births fell to 2·82, which was also the lowest figure ever recorded in this country. The death-rate from tuberculosis did not show any decline; the crude death-rate from all forms of tuberculosis last year was 636 per million living souls—1 per million higher than in 1938, but less than half the figure for 1914. Only one case of smallpox was notified last year; the reports of scarlet fever and diphtheria were fewer than in the year before; and the anticipated biennial measles epidemic failed to put in an appearance. On the other hand, there had been an ominous increase in the incidence of cerebrospinal fever, but even this disease was not so formidable as it was two or three years back, owing to the discovery of M. & B. 693. By the spring of this year that drug had already reduced the proportion of deaths from cerebrospinal fever almost to a third of the customary figure. Other sulphonamides were healing wounds more swiftly and proving effective in other diseases, notably pneumonia and puerperal fever.

STRAIN ON THE HEALTH SERVICES

The outbreak of war threw a new kind of strain on the health services. There were emergency homes in the country able to cope with some 2800 confinements every month, and this provision could be augmented whenever necessary. The number of expectant mothers leaving London just now was over 500 each week. City children evacuated to the country areas must be expected to benefit from the fresh air. Provision for adequate quantities of the right kinds of food was receiving attention. The inauguration of the nation-wide scheme of cheap or free milk for nursing mothers and infants was a milestone on the road to national good health. Health authorities on the outbreak of war had made plentiful provision for the care of the wounded by the recruitment of an army of doctors and nurses. It had been necessary to prepare for civilian as well as military wounded. In the Emergency Hospital Service, under one supreme operational direction, had been joined the fine equipment and great resources of the voluntary and municipal hospitals. To these had been added other public institutions, which by the provision of operating-theatres, X-ray apparatus and other supplies had been converted into first-class hospitals; in many cases these established buildings were now surrounded with whole villages of brand-new up-to-date huts, which could hold tens of thousands of extra patients. The cottage hospitals had been expanded; several mansions had been equipped as auxiliary hospitals, and supplies were stored in others. The halls and classrooms of some of our schools could be transformed into wards at a few hours' notice if the need arose.

MEDICAL LESSONS OF WAR

At the time of the withdrawal of the B.E.F. from Dunkirk some of the hospitals on the south-east coast became casualty clearing stations to which the wounded were borne straight from the field of battle. Further inland, the base hospitals opened their doors. In a week many thousands of casualties were admitted. The surgery, the doctoring, the nursing proved themselves of a high standard. A return from the London hospital sector, which bore the brunt of the work, indicated that even there only 1·7% of the men died of their wounds.

The battlefield was a laboratory into which, in a few weeks, were crowded experiences and opportunities for surgeons and doctors which at other times would not come to them in years. The first 12 months of war had already yielded its harvest; remarkable advance had been made in blood-transfusion, and in the storage of plasma. Valuable facts had been learned about the healing of burns, and there had been progress in the treatment of injured jaws and in plastic surgery. Rehabilitation of the wounded—whether military or civilian, due to war or the normal risks of industry—was being given full play in the Emergency Hospital Service. He had appointed an adviser in rehabilitation, and was also forming a strong committee of medical men to encourage its development in order that it might be the nucleus of an organisation of progressive value to victims of industrial and other accidents when peace returned. He paid a high tribute to the stretcher parties, the first-aid units, the ambulance teams, and the hospital orderlies, nurses and doctors who had performed their tasks—often under fire—with inexpressible coolness and skill.

USES FOR HOSPITALS

The numbers of casualties were slight in comparison with the strenuous and wanton efforts which the German airmen were making. At the moment only some 5500 beds in the wards were filled by air-raid casualties. It would be a mistake to feel too much assurance from that fact or to assume that we should not suffer worse before the enemy was finally beaten back from London to Kent, and from Kent across the Channel, and from the Channel over Europe until he was smashed on the soil of Germany itself. Large numbers of beds must be kept empty and ready to receive sudden casualties or sick in force, but not too many. There were other needs of the nation at war, and the authorities of the E.H.S. had been swift to recognise that they could play a great part in relieving them. The emergency hospitals were to be used for nursing the military sick, but he had agreed with the Minister of Labour that munition workers who fell ill away from their homes should also be nursed in them. In addition, large numbers of tired mothers and their children who were being evacuated from London were being taken for two days in a hospital ward in the country, where they had the best of care and an opportunity for rest, refreshment and recovery before going on to their billets. Moreover, the country hospitals were making room for many hundreds of invalids and aged and infirm people who, under war conditions, could not be cared for in their own homes.

VENEREAL DISEASE

The incidence of venereal diseases had shown a large and steady decline over the last twenty years, but there had been indications during the last few months that it was once more on the increase. This was partly a result of the new large congregations of population which had been created round military camps and in the neighbourhood of expanding war industries. In these places there was often no established service for the treatment of venereal diseases because there had previously been no great volume of cases to be dealt with. The service must now be extended. But the burden of financial responsibility should not fall mainly on the local authorities. He was asking them to maintain or expand their treatment service or to create new units where necessary, and he was also informing them that there would be an Exchequer grant of 75% of the cost. Officers of the Ministry were helping to establish an effective organisation. In many rural areas a mobile unit would be the best means of achieving results.

PROTECTION FROM AIR ATTACK

Mr. MacDonald assured the House that the Ministry of Health and the Home Office were closely coöperating in connexion with the health aspects of the shelter problem. They had the advantage of the advice of an expert committee under the chairmanship of Lord

Horder. He and his colleagues had spent much time studying conditions in the London shelters and and made a number of valuable recommendations every one of which was being acted on. The committee would watch the situation continuously, and their field of work covered the whole country. A proper standard of provision for health must be preserved in all the large shelters; the Ministry was coöperating with the local authorities and their medical officers of health; Mr. MacDonald was also appointing in the Ministry a body of medical experts who would see that the standards laid down were maintained. The burden of the problem, he said, is overcrowding. If the population in each of these refuges can be reduced to reasonable proportions, protecting them not only from bombs but also from germs and parasites becomes much simpler. Therefore the policy of evacuating people who can be spared from London gains added importance as winter approaches. And by a steady process of persuasion that policy is bearing abundant fruits. Already some 489,000 schoolchildren, about 50% of the whole school-child population in the London evacuation areas, have left. Mothers and children are now leaving London at the rate of several thousands each day. Some hundreds of the aged and infirm, who are amongst the most difficult problems in the shelters, are being taken out every few days to be cared for in hospitals and homes in the country. It is of supreme importance that the night-dwellers in shelters should be able to lie down in comfort and sleep the sleep of the just. That state of affairs will be achieved when the bunks have been set up. A healthy standard of sanitary equipment was being provided, and the local authorities had been given full power to engage whatever staff was required for proper cleansing. The medical officer of health in each borough was being made responsible for frequent inspection of public shelters. In each shelter holding more than 500 people there would be a first-aid post, which would contain supplies for dealing with headaches, ear-aches and other minor ailments, and also a sick-bay, in which people could be partially isolated. A nurse would be in attendance in the shelters every night and arrangements would be made for a medical practitioner to be attached—either in residence through the night or else available on call—to each of the large shelters. Inhabitants of the shelters who contracted infectious diseases or other serious illnesses would be sent to hospital. Other aspects of the problem were being examined, such as ventilation and the possibility of using some spray for disinfection. The Ministry was in close consultation with the Medical Research Council.

In the House of Lords the DUKE OF DEVONSHIRE, in a discussion of the problems arising out of the German bombing attacks on London, said that it was true that the Government had overestimated the number of casualties and had underestimated the amount of damage to property. The Home Office still supported the policy of dispersal rather than concentration in the provision of air-raid shelters. The Government were pressing on with the provision of more dormitory accommodation in shelters. More than a million bunks were on order and their installation would begin next week.

Some Criticism

In the debate which followed Dr. H. B. MORGAN said that the voluntary-hospital system was out of date; its finances were precarious and its administration wrong. Was the Minister of Health's policy for the future to bolster up that system and to extend the approved-society system, or was he going to accept the principle that every citizen was entitled to the best medical attention available irrespective of class, economic status or anything else?—Dr. HADEN GUEST said that the danger to the health of the civilian population was one of the greatest which threatened our war effort.—Sir FRANCIS FREMANTLE urged that rehabilitation should be carried out as thoroughly as possible. The B.M.A. had set up a commission on which two representatives of the Parliamentary Medical Committee had been appointed to serve, to inquire into the future of medical and hospital services. A great deal of latitude must be allowed. The extension of hospital and medical services was a model of prevision on the part of the last Government and the present one. Such extension at a time when it appeared to be useless had been much criticised, but we now knew how necessary it had been. There was nothing superfluous in it, although there were some hospitals still waiting for the work for which they were designed.—Dr. EDITH SUMMERSKILL said that the time had come when profit should be eliminated from the practice of medicine. A revolution had taken place in the medical services during the last seven weeks. Doctors in east London with vast panel practices had found their security gone and their practices dispersed. In Harley Street where were the cars outside doctors' consulting-rooms? Their wealthy patients were in the provinces. Doctors in west London were thanking God for the emergency medical services because they had got state support and could face up to their commitments.

Education Minister on National Physique

In the Commons on Oct. 16 Mr. RAMSBOTHAM, the President of the Board of Education, explained the policy underlying the physical-training side of the proposals he introduced last August. He warned the House that many months must elapse before he could report any measurable advance. The important thing in such a scheme is finance, and Mr. Ramsbotham is taking steps to see that adequate provision is made on that score. He estimated that the expenditure of local authorities would be two or three times larger this year than last. The aim in view, while it had a solid basis in improvement of the national physique, was, he said, also directed to the development of character and intelligence. It is a great pity that physical training should cease for boys and girls at 14 when children's bodies are still as immature as their minds. Unhappily at the present time it is impossible to undertake an extension of physical education within the framework of extended full-time education. But unless conditions become much worse it is thought to be a practical proposition to adopt the part of the Fisher Acts concerning physical education and involving the release of boys and girls from their work for an hour or two a week. Even this limited proposal, however, will require a great deal of preparation and organisation. For the moment the proper course is to help the local authorities and voluntary associations to extend and improve the physical education they are already providing. Mr. Ramsbotham described the steps he is taking to obtain the release from the Army, and prevent the further calling up, of key men who will be needed as instructors, organisers and leaders of the youth-training movement. The directorate have been instructed to lose no time in consulting their medical advisers, and doctors generally, on the measures necessary to ensure that the medical side is properly safeguarded, and the National Youth Committee is taking full advantage of the advice of Lord Dawson of Penn.—In the subsequent debate Sir FRANCIS FREMANTLE and others gave the scheme a warm welcome while strongly emphasising the importance of adequate medical supervision.

Money

Miss HORSBRUGH, parliamentary secretary to the Ministry of Health, announced in the House of Commons that additions to the supplementary pensions ranging from 1*s.* to 2*s.* a week will be made throughout the coming winter to needy cases.

Sir KINGSLEY WOOD in moving a vote of credit for £1,000,000,000 for war expenditure said that for the four weeks ending on Oct. 12, the total expenditure had averaged over £64,000,000 a week, a daily rate of more than £9,000,000.

QUESTION TIME

Rehabilitation

Mr. ELLIS SMITH asked the Minister of Pensions why men had been discharged after suffering from amputation without being supplied with artificial limbs; were the provisions for the rehabilitation of disability cases in operation; had the arrangements for the training of disability cases in order to equip them for industry been made, and were they in operation; and would he make a full statement on these problems.—Sir W. WOMERSLEY replied: I am medically advised that a short interval should elapse between the healing of a stump and the fitting of an artificial limb. No good purpose is served by keeping the man in hospital during this time and

he is accordingly discharged to his home, to which he is usually anxious to go, and is given a provisional pension at the 100% rate. As soon as the stump has settled down he is fitted with a limb at one of the Ministry's limb-fitting centres. The initial stages of rehabilitation are carried out while in hospital, and an interdepartmental conference convened by the Minister of Health has had under consideration the arrangements to be made for the completion of rehabilitation. A similar committee appointed by the Minister of Labour has been considering the arrangements for vocational training.

In answer to a question on the rehabilitation of civilians Mr. M. MACDONALD said that under the Emergency Hospital Scheme special centres, including remedial therapy departments and workshops, had also been established for the treatment of orthopædic and other types of injury which require rehabilitation.

Tuberculosis in Scotland

In answer to a question the Secretary of State for Scotland gave the following table of deaths in Scotland from tuberculosis:

1938	3rd quarter	766	1939	3rd quarter	782
	4th quarter	769		4th quarter	806
1939	1st quarter	995	1940	1st quarter	1180
	2nd quarter	943		2nd quarter	1069

He added: It is too early yet to say whether the recent rise in the tuberculosis death-rate has been simply due to the exceptionally trying weather conditions last winter in Scotland, which bore with particular severity on persons suffering from chest weaknesses.

Price of White and Brown Bread

Sir ERNEST GRAHAM-LITTLE asked the Parliamentary Secretary to the Ministry of Food whether he was aware that a recent report of the Wartime Social Survey, issued with the authority of the Ministry of Information, indicated that at least 66% of all classes of the population ate brown bread, and that this would be increased if the cost of brown bread were reduced to the level of white bread; and if he would reconsider the arrangements for provision of a national loaf and adopt a war-bread more in accordance with expert opinion.—Mr. R. BOOTHBY replied: The sample inquiry only covered selected districts in London and one provincial city. The percentage of those questioned who had purchased a brown loaf in the previous week varied in different districts between 38% and 65%. In only 11% of the cases was price given as a reason for purchasing white bread instead of brown.

Evacuation

The extension of the Government's evacuation scheme, said Mr. MACDONALD in reply to a question, applies only to mothers and children, aged, infirm and crippled persons who normally live in the London evacuation areas and in certain specified coastal towns and make thier own arrangements to be received in a reception or a neutral area. In all other evacuation areas certificates for billeting may be issued to mothers with children under five who make their own arrangements to be received in a reception area. They can take their older children with them. The position in all the evacuation areas will continue to be constantly reviewed in the light of the current situation.

Nurses at Rest Centres

Captain G. S. ELLISTON asked the Minister if he had considered the need for attendance of trained nurses at emergency rest centres and public air-raid shelters; and what action was contemplated.—Mr. MACDONALD replied: I have arranged, with the coöperation of the London County Council and the metropolitan boroughs, for the attendance of a trained nurse or other person of appropriate experience at all emergency rest centres, and am now taking similar action regarding large air-raid shelters in London.

Doctors' Attendance at First-aid Posts

Sir WILLIAM JENKINS asked the Minister whether he was aware that it had been not unusual for doctors attached to first-aid posts to report at those posts even on a preliminary warning of an air-raid, as well as on occasions when a public warning had been given which did not result in bombing or casualties; whether, as each such attendance involved the state in a payment of 1½ guineas in addition to a retaining fee of £70 in an A area, and 21 guineas in other areas, he would state the cost involved in the first six months of the year 1940; and whether he would consider some reduction in this cost, in view of the fact that so many A.R.P. volunteers rendered services who were called out for duty, and did so without any remuneration.—Mr. MACDONALD replied: I am not aware that doctors have usually reported at first-aid posts as stated in the first part of the question. Doctors should not receive payments in addition to any retaining fees, except for attendance at first-aid posts when summoned from the control centre, and at mobile units whenever a public warning is sounded. The position in regard to mobile units is under reconsideration. The figure of cost involved in the chargeable attendances is not available as a separate item for the period mentioned.

Doctor Detained

Sir ERNEST GRAHAM-LITTLE asked the Home Secretary whether he was aware that a member of the Emergency Medical Service, a fellow of the Royal College of Surgeons of England, had without any warning or reason given been put under arrest in Brixton Prison; and on what grounds this action had been taken.—Mr. HERBERT MORRISON replied: This doctor was detained on Sept. 20 under Defence Regulation 18B as a person of hostile associations and as having been concerned in acts prejudicial to the public safety or the defence of the realm. He has exercised his right of making objections to the advisory committee, who will hear his case as soon as practicable.

Milk for Invalid Children

In reply to a question Mr. BOOTHBY said: The Minister is unable at present to consider the extension of the National Milk Scheme to invalid children of school-age not attending school.

EAR PLUGS

Mr. H. N. G. Cobbe, M.Inst.M.M., writes to correct the impression created by our annotation of Oct. 12 (p. 459) that there is a similarity, both in appearance and function, between the Mallock-Armstrong Ear Defender and the rubber ear-plugs now being distributed to the public. For the latter, he says, no claim is made that they give any protection to the ear against damage; whereas the former has been proved many times in its 25 years of existence to give almost complete immunity from damage caused by a sudden rise in air-pressure in the vicinity of the ear. This is achieved by a sensitive diaphragm in the base of the defender, held between but out of contact with two fine wire screens. The diaphragm is free to vibrate within the limits imposed by the screens, and can therefore pick up and pass on to the ear all ordinary sounds of low intensity without diminution of volume. If there is a heavy explosion nearby the consequent blast forces the diaphragm inwards against the screen where it stops, so preventing any increase of pressure reaching the tympanic membrane. The defender thus obviates any possibility of a ruptured eardrum.

Mr. Cobbe also points out that the highly polished surface of the Mallock-Armstrong defender can easily be cleaned with a handkerchief, whereas the rubber plugs are semi-adhesive and would have to be frequently washed to ensure cleanliness. The defender's bulbous head obtains a firm grip in the canal, and when a proper size is chosen completely prevents any leakage of air. The greatest diameter of the Government plug is equal to that of the No. 2 defender, and since many people require larger sizes it is, he suggests, hard to see how they will obtain a satisfactory fit with the official plug.

The following new categories of interned Germans and Austrians eligible for release have now been added to the official list:—

Persons of eminent distinction who have made outstanding contributions to art, science, learning or letters: Students who, at the time of their internment, were pursuing a course of study at a university or technical college, provided that the vice-chancellor of the university or the head of the college certifies that it is desirable that the student should continue his studies at the university or college and that the circumstances are such that a British student would, in similar circumstances, be allowed to continue his studies. Any person as to whom a tribunal, appointed by the Secretary of State for the purpose, reports that he has, since his early childhood, or for at least 20 years, lived continuously, or almost continuously, in the United Kingdom; that he has long severed connexion with his country of nationality; that his interests and associations are British; and that he is friendly towards this country.

Letters to the Editor

ESPRIT DE CORPS

SIR,—I understand that the stench in a London tube after it has been used for a night is beyond belief. I wonder whether it would be possible to resort to the old-fashioned charcoal to help in this connexion. Its power in abolishing smells is very considerable and has largely been lost sight of. A former chief once told me that he knew a pharmacologist who actually put a dead cat into a charcoal box and kept it in his drawing-room. Periodically he examined the corpse and noted that it underwent complete dissolution, leaving only the skeleton (and I suppose the ligaments), without its having caused any smell in the room. Perhaps his guests were too polite to say anything, or perhaps they just took smells for granted in the house of a professor of pharmacology, but I think it was a valid experiment with considerable significance. Another of his friends (they seem to have had a grim sense of humour in those days) kept a charcoal box in his room and used to pass his urine into it. He pointed out that the porous material took up the fluid, "fixed" the various contents which came out on evaporation, and retained the smell. Though I have not adopted the practices of either of these enterprising fellows I had occasion some months ago to apply the principle of their experiments. I was looking after a woman who had a suppurating knee-joint associated with pyæmia. The smell was appalling, and many of her visitors couldn't stand it. I ordered lumps of charcoal to be prepared about the size of cube sugar. These were put in muslin bags the size of one's fist and slung around the dressings, and several more bags were put in the bed. The procedure was completely successful, and nurse's improvisations, such as bowls of Dettol about the room, were discontinued. I tried to give the impression that it was all in the day's work, but secretly I was greatly astonished at the effectiveness of this old remedy.

Do you think the experts would consider putting thin slabs of charcoal—say 36 by 36 by 2 in.—along the roof of the tube (and other) shelters?

Glasgow. STANLEY ALSTEAD.

DRY DRESSING

SIR,—For some time I have been advocating a dry dressing or no dressing at all in the treatment of wounds which one wishes to heal by so-called first intention. The unpleasant appearance and frequent infection of wounds which are dressed for the first time with a moist compress or left for some time under an air-tight covering should be better appreciated. The wounds I have been seeing lately which have been treated at a first-aid post or elsewhere have provided striking proof of the value of the dry dressing. Some multiple abrasions or lacerations have defied the ingenuity of the dressing stations to cover them entirely, and the healthy appearance of the uncovered wounds contrasts so markedly with the moist white unhealthy appearance of the enclosed wounds that no-one would hesitate in choosing which was the more effective method. The enclosed wounds are usually covered with a compress of acriflavine and water, or sealed over with strapping, sometimes alone but more often over gauze, whereas I am convinced that the best dressing of a wound for the first time, after preliminary cleaning, and certainly if cleaning is to be left to the casualty clearing station, is a dry gauze or gamgee pad.

Moisture washes dirt into the wound, prevents the rapid clotting of blood (hindered still more by antiseptics), provides a warm, moist nidus for bacterial multiplication, and produces sodden white unhealthy wound edges. We have progressed so far in our treatment of serious war injuries that, after offering what assistance we can in the removal of debris, we leave the rest to nature; in less serious wounds this principle should be borne in mind, and nature's efforts should not be hindered by the use of watery antiseptics in the first twenty-four hours. Other solutions, such as dilute iodine or Dettol cream, have not the same objections; though they have their drawbacks they are sometimes extremely useful. Of course once infection is established, or granulation tissue present, the objections to the use of water do not apply. The important thing is, during the first 24–48 hours, to avoid water, and—what amounts to the same thing—to avoid the air-tight enclosure of a wound so that it becomes sodden from skin sweat.

Hammersmith, W.6. J. G. BONNIN.

E.M.S. SALARIES—AND OTHER THINGS

SIR,—Mr. Maxwell Ellis has misapprehended the steps which are likely to be taken with regard to the E.M.S. There is no intention to restore the voluntary system which is what I asked for a year ago; all that is contemplated is to make certain changes in the methods of remuneration. I may mention in passing that Mr. Ellis is more fortunate than many of his colleagues in that he will, if he remains in the E.M.S. and the changes foreshadowed by the select committee are put into operation, receive sessional payment and surely the value of this would depend upon the frequency of the "occasions" for which payment may be claimed. The sorry plight in which the profession now finds itself is, I submit, the direct result of the disastrous and senseless measures taken at the outset of war by the Ministry of Health, measures which, to repeat Wilfred Trotter's apt description, bore "the diagnostic marks of having been affected by panic," and which "half-paralysed" medical practice in London.

Early in September, 1939, I was bombarding the Minister of Health with parliamentary questions and suggestions to release for part-time service the staffs of the voluntary hospitals, seven-eighths of whom had been for practical purposes "conscripted" before the outbreak of war. On Oct. 11 I obtained from the minister the concession that members of the honorary staffs who wished to do so would be accepted for E.M.S. work on a "gentleman's agreement" that they would respond to the call for full-time service when necessity arose, but that in the meantime they would be completely free to continue their peace-time obligations. I obtained the minister's permission to read the letter in which this offer was made at the meeting of the Royal College of Physicians on Oct. 12, but by this time the ministry had largely forfeited the confidence at any rate of the consulting section of the profession, and the offer received only negligible support.

I gave as objective an analysis as I could of the report of the select committee on the E.M.S. for its first year of work. Naturally that report would not in any way deal with the question Mr. Ellis raises—namely, the transfer of redundant E.M.S. officers to the R.A.M.C. How far the recent developments of the crisis may modify the recommendations of the select committee it is not possible to foresee.

This leads me to refer to another subject, suggested by a leader in your issue of Oct. 12 on tetanus immunisation on the home front. Before I saw this I had put down a question asking the Minister of Health to make provision for tetanus immunisation of members of the Home Guard, and I have just received an answer from the Secretary of State for War announcing that this is under consideration by the Government. I understand it would make things much easier if the medical profession would undertake the administration of the required injections free of charge, the material being supplied by the Government. As members of the Home Guard are themselves giving their services without payment it would, I submit, be a graceful gesture for the profession to make. Here then is an opportunity to dissipate the boredom complained of by Mr. Maxwell Ellis which I hope, and feel sure, the medical profession will gladly accept.

Wimpole Street, W.1. E. GRAHAM LITTLE.

TYPHOID ABSCESS TREATED WITH SULPHAPYRIDINE

SIR,—A patient of mine contracted severe enteric fever in November, 1932. In March, 1934, he developed acute pain in the upper part of the right tibia with much local tenderness and swelling. After a few days I incised the periosteum, giving exit to a little fluid, and he remained free from symptoms until January, 1940, when they recurred. I gave him a course of M. & B. 693

and within a week all symptoms had disappeared, but they appeared again in September. A further course of M. & B. 693 had no effect. I opened the affected area and found the bone like ivory; by cutting away the overlying bone I disclosed a channel about 1½ in. long, which contained about ʒ ij of thick yellow pus. The walls and floor were like the roof. Examination by the local Pasteur Institute gave a pure culture of one of the Eberth-paratyphoid group. Packing was removed after 24 hours and not reintroduced. Rapid healing followed.

English Clinic, Tangier. F. J. W. PORTER.

DEATH AND DYING

SIR,—Dr. Ryle throws aside all but "the motor and sensory activities of life," limiting them to "the structures which subserve life," dissolution of which will leave nothing by which to "move and feel in the way that we have been accustomed to move and feel." Does he seriously contend that our whole being, body and soul, is limited to the narrow range of human vision, hearing, touch and smell? What vestige of evidence has Dr. Ryle that will and choice, love and hatred, reproduction, creation and life are dependent on "the structures which subserve life" and are dissolved at death? I say, in the bare spirit of scientific, physiological and psychological truth: none whatever. Dr. Ryle's view of death is a naked materialism, a shallow paganism, totally out of step with our universities. It is not, of course, the view of the great mass of mankind; it is not the view of the philosophers; it is not, surely, the common view of general medical practice. It can only be put forward by men whose outlook is confined to the narrow limits of "natural" science, neglecting the dominating rule of the spirit, with its all-permeating activity of which we have the most certain evidence, describable only by analogy and symbol. The medical profession, if un-ecclesiastical, is and must always be religious at heart and convinced of an after-life, offering a nobler view of death than the complete wash-out and annihilation which is all the comfort Dr. Ryle's dismal paganism has to offer.

Hatfield, Herts. FRANCIS FREMANTLE.

SIR,—Professor Ryle has based his thesis upon his own experience and one listens to him with the attention that his keen observation and clear induction always command. But as well as his observations of those dying he has also given us certain statements about death—statements made as fact, although he says that men have no chance to leave records and in consequence he can have no autobiographies of death, as opposed to dying, upon which to base his statements. His statements about death are:

(1) That it is a peace supplied by oblivion.

(2) That it is an oblivion not different from that of the fœtus in utero.

(3) That "those whose lives are compounded of action and a faith in mutual aid need know no death."

(4) That those in the same category as under (3) will know no terror and no shame while dying.

and he bases them upon the following argument:

(1) All sensory and emotional activities of human beings depend upon the functional integrity of the exquisitely delicate material body.

As far as we can observe here and now this appears to be true.

(2) So "elaborate and perfect" is this body that we cannot conceive the disintegrating body as experiencing these activities.

I must agree.

(3) The stimuli normally provoking these activities in a living body evoke no response from a dead one—

Agreed observed fact.

(4) We cannot believe that any other part of us remains to feel and move in the way that we have been accustomed to feel and move if the structure subserving life is disintegrated and motor and sensory activity ceased in consequence. If the body is dead and its activity ceased we cannot believe as logical and scientific beings that anything remains to feel and move as the body did when it was alive.

I am uncertain whether Dr. Ryle means (*a*) that we have no logical or scientific grounds for the belief in something remaining; or (*b*) that if we are logicians or scientists we cannot believe that anything remains. In the former case I agree there are no scientific grounds for the belief but he advances no logical grounds for belief or unbelief—his argument has been purely physical and not metaphysical. In the latter case I must simply respectfully disagree.

(5) For us ("logical and scientific beings" and "rationalists") death *must* mean arrest of activity—i.e., sensation, thought and motion as we now understand it and oblivion as in utero.

(6) This arrest and oblivion must be so even if there be a spirit separate from sensation, thought and motion as we understand it.

In these points Dr. Ryle claims that for us as logical, rational and scientific beings (*a*) death must mean cessation of all life as we know it, and (*b*) even if there should remain a spirit separate from life as we know it—at least a hypothetical concession to the complete argument—then "it," although "it" has ex-hypothesi potentialities surviving bodily death, must still be condemned for certain to an oblivion—i.e., to a state of forgetting or having forgotten or to the condition of being forgotten (both meanings allowed by the New Oxford Dictionary)—and this forgetting or forgotten state "not different from that which obtained before we left the womb."

Now first, if there is not a spirit separate from and surviving bodily activity then (*a*) the fœtus is only a fœtus and no part of it has any previous state to forget, (*b*) the peace of oblivion has no meaning, for peace is a state and to be felt demands a sentient self-conscious being to feel it. Equally "forgetfulness" or "forgotten" implies state or being or it has no meaning. Without the, in some way, sentient survivor all the dead are on a flat level of annihilation.

Secondly, if there is a spirit, Dr. Ryle says that it is in a state of intra-uterine oblivion. This presumably means a forgetfulness of what has gone before—implying at least that the "it" in the fœtus had a conscious existence before incorporation, for he cannot mean simply that it forgets what happens from moment to moment. The physical machinery subserving mind is in becoming during gestation and I submit that it is as far beyond any scientific observer to say when a human being starts using (not displaying) the rudiments of memory as it is impossible for a scientist to make observations of the state after death. The thing is simply not within the reach of his material senses.

Again the "it" incorporated in the fœtus has all its functions in potentiality—not used. The "it" after death is necessarily as different as fulfilment must be from potentiality though for each individual in varying degree; yet Dr. Ryle would deny the survivor any memory because that which subserved thought when the "it" was in corpore no longer exists. I have shown that a sentient self-conscious survivor is necessary even to his own statements about death and he can, in the nature of things, know nothing scientifically of the state of the survivor and the apparatus subserving its functions.

As scientists, therefore, we can have nothing to say about the after-death state of any possible immortal part of us. As rational and logical beings, however, we can say a great deal—i.e., as metaphysicians but not as scientists. Here I cannot but feel that Dr. Ryle himself has invented an idea with neither scientific nor logical evidence in support and pressed it as the only reasonable belief on scientific grounds. Further to discredit other beliefs about death associated with "conventional religious influence" religion and superstition have been bracketed and the same statements made to apply to both so that in the reading they appear synonymous. Finally the suggestion of the bribe of wings, haloes and harps is surely too simple an Aunt Sally to be put up as a fair example of the idea of existence after bodily death which religion has to offer.

This is not the place to offer the evidence that others are prepared to accept about the state after death. Certainly we have no need to fear it, but not for Dr. Ryle's reasons. I have left untouched the question as to whether the survivor feels or moves as he was accustomed to feel and move here in favour of major issues. For the same reason and because his meaning is not clear to me I have not commented upon his third and fourth attributes of death.

Edgware, Middlesex. F. HARWOOD STEVENSON.

Obituary

HENRY HEAD

K.T., M.D. CAMB., F.R.C.P., F.R.S.

Henry Head lived a life crowded with careful observation and with constructive and adventurous experiment. He was born of a Quaker family 79 years ago at Stamford Hill; his father was a member of Lloyds. He died at Reading on Oct. 8. As a boy he gained a science scholarship at Charterhouse and on leaving school was elected to a scholarship at Trinity College, Cambridge, of which he later became an honorary fellow. He took a first-class in the natural sciences tripos and then went abroad for a time to the University of Prague. His medical training was completed at University College Hospital; he qualified in 1890 and took his M.A. and M.D. at Cambridge in 1892. His M.D. thesis on disturbances of sensation with special reference to the pain of visceral disease was extended later and published in *Brain* in 1893, 1894, and 1896. This piece of work established "Head's areas"—the regions of increased cutaneous sensitiveness associated with diseases of the viscera. Later he was his own subject in an experiment on section of cutaneous nerves, from the results of which he elaborated the conceptions of protopathic and epicritic sensibility. He also investigated, with Gordon Holmes, the path of afferent impulses in brain-stem and thalamus, and of function in the receptive areas of the cortex. After qualifying he had held house appointments at U.C.H. and Victoria Park; he also worked for a time as clinical assistant at Rainhill County Asylum, continuing his neurological studies. He became registrar at the London Hospital, and subsequently, in 1896, assistant physician. In 1899 he was elected a Fellow of the Royal Society, receiving the Royal Medal in 1908; he delivered the Society's Croonian lecture in 1921. He became a member of the Royal College of Physicians in 1894 and a Fellow in 1900, and delivered the Goulstonian lecture of the College in 1901 on mental symptoms associated with visceral disease, and the Croonian lectures in 1911 on sensory disturbances from cerebral lesions. He was awarded the Moxon Medal of the College in 1897 and, in 1903, the Marshall Hall prize of the Royal Medical and Chirurgical Society for work "adjudged to be pre-eminent for its originality." During the last war he gave up private practice and, living at the hospital, devoted his whole time to the soldiers admitted there. Dr. George Riddoch, recalling him at this period, tells of his stimulating enthusiasm, his tolerance of youthful extravagance provided it was tempered by intelligence, and his capacity for work. But a few years saw the onset of Parkinson's disease which slowly encroached on his activities; with great practical address he planned his life ahead to circumvent his growing disability. He at least had the knowledge that his mind would remain unimpaired and he kept alive his wide interests in science, literature, music and human affairs. Mr. Robert Nichols (*Times*, Oct. 15) remembers him as a conversationalist who could talk with knowledge in the course of an evening on the influence of reasoning on Goethe and Mozart, apprehension in listeners to symphonic music, looping the loop, co-ordination in a golfer, Ninon de Lenclos, Conrad, religious ecstasy, and social customs in Melanesia. He wrote much, not only scientific work, but verse and translations of verse from the German. From 1910–25 he edited *Brain*. His wife was the daughter of Mr. A. L. Mayhew of Wadham College, Oxford. She died last year; they leave no children.

Elliott & Fry

Sir Charles Sherrington writes: "The retirement, owing to ill-health, of Henry Head from active work some years ago fell like a shadow across neurology; and now his death comes as more than a reminder of that loss. Qualities of knowledge and of character united in him to make an inspiring and loved figure, both as to fellowship and leadership. He had attained a great position and an influence which far from remaining static was growing and dynamic for those who pursued his subject. Of ways in which he was exceptional one, we may think, was that, though in our time it is evident enough that the ward and the laboratory offer for scientific study a certain aspect entirely in common, it yet is given to few, as it was given to Head, to use the one as competently as the other. His enthusiasm for inquiry, his tireless industry, and his breadth of view accompanied his mastery of both.

"His earlier career established him as a worker of distinction in physiology and in psycho-physiology. Later the clinic with its directly human problems, and particularly those of neurology, appealed to him irresistibly. There ultimately, both as investigator and teacher, his career reached its fulfilment. Among his themes of predilection two, the referred pains of visceral disease ['Head's areas'] and disturbances of speech accompanying disease of the brain, carry his name with them wherever they are studied. Characteristic of him was that no problem ever deterred him by its size. Extensive problem as was that of the pains accompanying visceral disease, he made of his inquiry into it a comprehensive and systematic survey of its entire field. I remember how his case-boxes—for he used haberdashers' boxes to keep his case-notes—filled shelf upon shelf. With his investigation the subject entered a fresh phase. The other of the two themes above-mentioned was of still wider venue and with yet more intricate ramifications on another plane. His work upon it was finally issued, collected in two volumes, fourteen years ago. It had of course philosophical as well as more purely medical bearings, and I well remember hearing the late Professor Alexander speak in admiration of its originality and power. Aphasia is a subject on which not a few great reputations have foundered, but Head's contribution touched firmer ground and marshalled broader facts.

"He had vivid loyalties, and in science an abiding one of them was to his Cambridge teacher, Dr. Gaskell. Again, to the genius of Hughlings Jackson his tribute, manifold and personal, amounted almost to a feature of his writings. As a teacher he had himself a wide and devoted following. In his lecturing some slight mannerisms endeared themselves to his audience as very symbols of him. After his retirement not a few eminent visitors from abroad made his retreat a place of pilgrimage to offer him their admiration and affection—among those who on more than one occasion did so may be mentioned the late Dr. Harvey Cushing of Yale."

PROFESSOR BIELSCHOWSKY

Max Bielschowsky, who died in London on August 18 in his 72nd year, was known to all neurologists and histologists from the staining method for neurofibrils which he devised in 1902 and which has largely replaced the method of Cajal on which it was based. It was indeed the foundation for the methods by which Del Rio Hortega and his pupils have illumined the neuroglia and microglia. Most of Bielschowsky's working life was spent at the Kaiser Wilhelm Institute for brain research in Berlin, where he patiently investigated the pathology of diseases of the brain, especially amaurotic family idiocy and tuberous sclerosis. When a pupil of Edinger at Frankfurt a/M. he came under the influence of Nissl, and his writings were always informed with the clear conception of neuronal structure in health and disease which Nissl established. The short chapter which Bielschowsky wrote in Penfield's Cytology of the Nervous System on the histopathology of nerve-cells sums up Nissl's teaching and includes much of his own original work. After his exile in Holland he published a masterly statement of present-day knowledge on the general histology and histopathology of the nervous system in Bumke-Foerster's Handbuch der Neurologie.

Something both of the artist and the philosopher was seen in Bielschowsky's writings. They were always beautifully illustrated, and in his discussions of cause and effect he always strove for a unifying conception of

the processes of disease in the nervous system, without however bringing to his aid such vague generalisations as Vogt's pathoclisis. He will be missed both as a master of his craft and as a single-minded searcher after knowledge.

WILFRED GRENFELL

K.C.M.G., M.D. OXFD, F.R.C.S.

COMPARATIVELY few men leave their stamp so clearly on the scenes of their deeds that they achieve a natural title; Grenfell of Labrador was one of these. He died in his home at Charlotte, Vermont, on Oct. 11 at the age of 75. He was born at Parkgate, near Chester, and spent his boyhood on the Sands of Dee "simply messing about in boats"—a hobby which had a value for many people later in his life. He took a scholarship at Marlborough and there his tastes included chemistry, mathematics and boxing. After a term at Oxford, during which he played football for the university, he trained in medicine at the London Hospital, and was secretary in succession to London University cricket, football and rowing clubs. One night he went into a tent at Shadwell and came out so much moved by the evangelism of Dwight Moody that his sturdy Christianity took a practical turn which coloured all his later actions. He qualified in 1886 and visited the North Sea fishing fleet as a member of the Mission to Deep Sea Fishermen. Like Treves, his teacher at the London, he held a master mariner's certificate, and when he was invited to inquire into the physical and spiritual needs of the fishermen in the north-west Atlantic he gladly undertook to do it. He sailed across, in 1892, in a small ketch-rigged hospital ship. When he got to St. John's in Newfoundland it happened to be on fire for the third time in its history. Sailing along the coast of Labrador, he put into the coastal ports of the Hudson Bay Company and treated some 900 patients. He found in all between fifteen and twenty thousand white fishermen, Indians and Eskimos living under conditions of great hardship; no hospitals were available to them and little chance of help when they were sick. When he retired in 1934 the Grenfell Association was responsible for five hospitals, seven nursing stations, two orphanages, fourteen industrial centres, four summer schools, three agricultural stations, twelve clothing distribution centres, four hospital ships, one supply schooner, twelve community centres, a cooperative lumber mill and a haul-up slip for ship repairs—no mean record for one life's work.

Russell, London

His practice during fifty-eight years covered the coasts of Newfoundland and Labrador; his patients were poor honest men living by fishing, furring and sealing. He began by attacking disease; one small hospital made the first link in the chain of five, and then he began to found schools and orphanages, to establish fox farms and sawmills. His schemes exceeded the means of his mission, so he started lecture tours in Britain and America, and as result the International Grenfell Association was founded, with an endowment of £200,000. He had a great belief in the resources of Labrador—the rich forests of spruce, fir and poplar ready for paper making, the mineral ores, the water power, the abundance of cod, salmon and reindeer. He thought, too, that tourists, once introduced to the beauties of that coast, would visit its fjords and rivers as keenly as they do those of Norway, and in 1934 two tourist steamers visited the coast. He saw Labrador as important in an Imperial air system. Young men and women sent by the association to train in Canada and the United States returned to work among their own people, and volunteers from all over the world came to help him as doctors, nurses and teachers. During the last war he was a major in Harvard's surgical unit at Boulogne.

His honours were many. In 1927 he was made a K.C.M.G., and in the next year was elected Lord Rector of St. Andrews University; Oxford made him her first honorary M.D.; St. Andrews, McGill, Toronto, Harvard, Princeton and several other universities conferred honorary degrees upon him. He received the Murchison grant of the Royal Geographical Society, the Livingston gold medal of the Royal Scottish Geographical Society, and the gold medal of the National Academy of Social Sciences of America. He wrote many books, mostly about Labrador. In one of these—"Adventure in an Ice Pan"—he tells how for two freezing days and a night he was marooned on a small ice-floe, clad in scanty wet garments and with seven husky dogs for company—a story of hardihood and resource. He married Miss MacClanahan in 1909; she died in 1938. They leave two sons and a daughter.

DR. ROBERT GRIEVE, who with his wife was killed during an air-raid in the Sudan, was an American member of the Sudan Interior Mission. He graduated B.Sc. from the University of Oregon in 1935, and three years later took his medical qualification at the medical school. For a year he was an interne at the Deaconess Hospital at Spokane, and during this time he passed the state ward examination and was licensed to practice in the state of Washington. Dr. and Mrs. Grieve sailed from New York for the Sudan last October and in January they were appointed to the mission station at Doro, some 500 miles south of Khartoum. There they worked among the Maban people, a primitive tribe hitherto unreached by missionary effort. Dr. T. A. Lambie, field director of the mission, writes that Dr. and Mrs. Grieve were steadily winning the confidence of the people and had already persuaded a number to submit to necessary operations.

MAJOR WILFRED BURNET FARIS ORR, who died at Llandudno on June 28, had served in France from the beginning of the war and took part in the evacuation of Dunkirk. He was born in 1899, the son of the late Dr. James Orr of Templepatrick, co. Antrim. He graduated M.B. from the Queen's University, Belfast in 1921 and obtained a commission in the R.A.M.C. in 1923. He was promoted captain in 1927 and major in 1934. He took his D.P.H. in 1927 and in 1931 he was awarded the Leishman silver medal and the Parkes memorial bronze medal.

Appointments

BOUCHER, H. B., M.B. Lond., F.R.C.S.E., D.T.M. & H.: temp. asst. M.O.H. for Plymouth.

BRIGGS, G. O. A., M.B. Camb., M.R.C.P., D.P.H.: medical superintendent of Nottingham's new sanatorium.

TREE, MARK, M.B. Lond., F.R.C.S., D.O.M.S.: surgical registrar at the Birmingham and Midland Eye Hospital.

WALKER, J. V., M.D. Birm., M.R.C.P., D.P.H.: M.O.H. and school M.O. for Ramsgate.

WILLIAMSON, H. C., M.B. Belf., D.P.H.: asst. M.O.H. for Oldbury.

Births, Marriages and Deaths

BIRTHS

MILES.—On Oct. 13, at Tiverton, the wife of Surgeon Lieut.-Commander T. F. Miles, R.N.—a daughter.

SPICER.—On Oct. 13, at Drayton, Norwich, the wife of Dr. E. R. Spicer—a son.

MARRIAGES

BOLTON—POWELL.—On Saturday, Oct. 19, Robert H. Bolton, M.D., to Felicity Powell Pearson.

WILLIAMS—RIDGERS.—On Oct. 12, at Cleeve Hill, Gloucestershire, Bryan Williams, F.R.C.S.E., to Marjorie Ellen Ridgers.

DEATHS

BUCKLEY.—In October, as the result of enemy action, Leonard Buckley, M.B. Lpool, major R.A.M.C., of Wincanton, Somerset, and Liverpool, aged 54.

BURGESS.—On Oct. 18, Norman Francis Clifford Burgess, M.D. Camb., M.R.C.P., of Bristol.

PLATT.—On Oct. 13, at Hampstead, Kate Anne Platt, M.D. Lond., first principal of the Lady Hardinge Medical College, Delhi.

SANDERS GREEN.—On Oct. 14, Algernon Sanders Green, M.B. Lond., of Great Witley, Worcestershire, aged 46.

SCHOLBERG.—On Oct. 14, at Lisvane, Cardiff, Harold Alfred Scholberg, M.B. Lond., D.P.H.

WATKINS.—On Oct. 14, Arthur Muriel Watkins, M.R.C.S., of Fleet, Hants, and late of Whitchurch, Salop.

WHITE.—On Oct. 12, as a result of enemy action, Charles Francis White, M.B. R.U.I., lieut.-colonel R.A.M.C. (retd.), aged 61.

Medical News

University of Cambridge

During the absence of Prof. John Ryle on national service Dr. R. A. McCance has been appointed to act as head of the department of medicine.

Royal College of Surgeons of England

On Oct. 21 and 23 at 3 P.M. Dr. John Beattie will deliver two Arris and Gale lectures on hæmorrhage. On Oct. 30 and Nov. 5th he will speak on fluid therapy. All the lectures will be given at 1, Wimpole Street, London, W.1 at 3 P.M. They are open to medical practitioners and advanced students.

The museum demonstrations which were to have been held on Mondays and Fridays during October have been cancelled.

Royal College of Surgeons of Edinburgh

At the annual meeting of the college held on Oct. 16, the following office-bearers were elected for the ensuing year:—

President, Dr. H. M. Traquair; vice-president, Mr. W. J. Stuart; secretary and treasurer, Mr. J. W. Struthers; members of the president's council, Mr. James M. Graham, Prof. R. W. Johnstone, Sir John Fraser, Mr. A. Pirie Watson, Dr. G. Ewart Martin, and Mr. Francis E. Jardine; representative on the General Medical Council, Mr. Alexander Miles; convener of museum committee, Mr. W. Quarry Wood; and librarian, Dr. Douglas Guthrie.

At a meeting of the college held recently, with Dr. H. M. Traquair, the president in the chair, the following were admitted to the fellowship:—

Segulla Aptekar, M.B. Bombay; J. J. Commerell, M.B. Cape Town; L. G. Cruickshank, L.R.C.P.E.; G. F. Dommisse, M.B. Cape Town; B. W. Goldstone, M.B. Lond.; J. L. Griffith, M.B. Camb.; S. P. Gupta, M.B. Lucknow; Kathleen M. D. Harding, M.D. Lond.; R. N. Houlding, M.B. Lond.; C. L. O. Macalister, M.B. St. And.; K. C. McKeown, M.B. Belf.; A. I. S. Macpherson, M.B. Edin.; C. R. Palfreyman, M.B. Melb.; A. R. Parkes, M.B. Edin.; L. H. A. Phillips, M.B. Sydney; J. L. D. Scott, M.B. Sydney; H. O. Smith, M.D. Ontario; W. J. Watt, M.B. Cape Town; A. W. Wilkinson, M.B. Edin.; and M. O. Youssef, M.B. Cairo.

University of Glasgow

On Oct. 19 the following degrees were conferred:—

M.D.—L. D. W. Scott (with high commendation); and Robert Cameron.

Ch.M.—E. W. Grahame.

Service Casualties

The following R.A.M.C. officers are reported to be prisoners of war:—

Lieutenant G. D. Cribb, M.R.C.S., A./Major W. M. MacLeod, M.B. Lond., Lieutenant H. Rosenberg, M.R.C.S., Lieutenant A. Taylor-Smith, M.B. Edin., Lieutenant R. F. K. Webster, L.R.C.P.E. and Lieut.-Colonel T. H. Wilson, F.R.C.S.

Royal Air Force

The following promotions in the medical branch are announced:—

Air-Commodores to be Air Vice-Marshals (temporary): William Tyrrell, M.B. Belf. and H. E. Whittingham, F.R.C.P.

Group-Captains to be Air-Commodores (temporary): W. A. S. Duck, M.R.C.S., A. E. Panter, M.R.C.S., Andrew Grant, M.B. Edin.

Health in the Shelter

On Oct. 5 Sir Arthur MacNalty, with other officers of the Ministry of Health and representatives of the Ministry of Home Security and the Department of Health for Scotland, met the medical officers of health of the metropolitan boroughs to discuss measures for the prevention of epidemic and other disease in rest centres and air-raid shelters. Lord Horder and Dr. Allen Daley of the London County Council were also present. Sir George Chrystal, who took the chair, explained that the primary responsibility for the control and management of shelters belonged to the Ministry of Home Security but the Ministry of Health had great interest in and responsibility for matters affecting public health. Lord Horder's committee had made recommendations which were necessarily in general terms. As regards rest centres, Dr. Daley explained that the L.C.C. were providing doctors and nurses, sick bays and drugs at the centres on behalf of the Ministry of Health. The beds available for the chronic sick had been greatly reduced but hospital provision was being made for them. People were staying too long in the rest centres and local authorities should be pressed to expedite the provision of billets and the emergency repairs to houses. It was generally agreed that it was impossible to prevent persons suffering from infectious disease entering shelters, and a suggestion of some form of cursory inspection at the entrance was rejected. The real solution consisted in reducing the numbers using the shelters by evacuation of the population to less crowded parts of the country. There was some diversity of opinion as to whether the provision of bunks would necessarily reduce the number of people using the shelters. Various suggestions put forward in a report by Dr. Maitland Radford (St. Pancras) were received with approval and the meeting was informed that the question of payment for the medical and nursing work involved was under urgent consideration by the Ministry of Home Security. The desirability of compulsory inoculation against diphtheria and typhoid was discussed. It was agreed that it would be very difficult to arrange for a doctor to be in continuous attendance in the shelters, except possibly in very large ones, but some scheme should be worked out in each borough to ensure that the services of a doctor were available for cases which could not be dealt with by nursing and first-aid personnel. Dr. James Fenton described such a scheme which was in operation in Kensington. The provision of red-cross nurses with a home-nursing training should be possible and the difficulties in the way of providing some sick-bay space were not insuperable. The prevalence of nasopharyngitis was referred to and scabies of a septic type was recorded from one area. Lord Horder's committee was considering the question of disinfection and disinfestation with the aid of expert committees of the Medical Research Council. The Ministry of Home Security was devising a code of good conduct by-laws for shelters, which would shortly be issued.

Middlesex Hospital

The pre-clinical students of this hospital have gone to the University of Leeds, where, by the courtesy of the vice-chancellor, they will be taught by their own professors for the London degree in medicine, and for the examinations of the Conjoint Board and other examining authorities. Most of the clinical students are still at the Middlesex Hospital, but owing to the lack of clinical material some are attached to Tindal House Emergency Hospital, Aylesbury, and Mount Vernon Hospital, Northwood. The students will be moved between these three hospitals according to the stage of their studies. The school has not been "evacuated," but the students have been attached to hospitals where the greatest clinical facilities are available.

Civil Defence Award

Dr. Elsie Burns, principal resident medical officer at the Liverpool City Isolation Hospitals, has been brought to notice for good service in connexion with civil defence.

The section of odontology of the ROYAL SOCIETY OF MEDICINE will meet on Monday, Oct. 28 at 3 P.M., at 1, Wimpole Street, W.1, when Dr. Evelyn Sprawson will deliver his presidential address. He will speak on forensic aspects of the teeth and jaws. On Wednesday, Nov. 6 at 2.30 P.M., the sections of surgery and therapeutics will discuss the treatment of burns.

A meeting of the MEDICAL SOCIETY OF LONDON will be held on Monday, Oct. 28 at 3 P.M., at 11, Chandos Street, W.1, when Colonel Max Page, Colonel Leonard Colebrook and Mr. W. H. Ogilvie will open a discussion on the chemotherapy of war wounds.

Lady Mackenzie, M.B., widow of Sir Colin Mackenzie, who holds an honorary administrative post at Australian Army headquarters, has been appointed a captain in the reserve of the Australian Army Medical Corps.

Colonel Hugh Richardson, M.D., has been appointed a temporary assistant in anatomy in the University of St. Andrews.

The time of attendance for out-patients at the National Hospital, Queen Square, has been changed from 1 P.M. to 11 A.M. The time for admission of inpatients remains unaltered.

MESSRS. T. J. SMITH & NEPHEW (Hull) are supplying their Cellona in widths of 18 in., 24 in., and 36 in. for use in the "closed" treatment of wounds. The plaster is supplied in rolls on card cores and is wrapped in grease-proof paper. Cellona is also available in the following sizes: 6 in. by 4 yd., 8 in. by 4 yd., 4 in. by 6 yd., 6 in by 6 yd., and 8 in. by 6 yd.